EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

A THESIS SUBMITTED TO

BABA FARID UNIVERSITY OF

HEALTH SCIENCES, FARIDKOT (PUNJAB)

IN THE PARTIAL FULFILLMENT

FOR THE AWARD OF DEGREE OF

MASTER OF SURGERY

IN

GENERAL SURGERY

2024

Submitted By

DR. PRATEEK GUPTA

DEPARTMENT OF GENERAL SURGERY

DAYANAND MEDICAL COLLEGE AND HOSPITAL

LUDHIANA, PUNJAB

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled **"EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** submitted towards partial fulfillment of the requirements for the award of **MS GENERAL SURGERY** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Amandeep Singh Nar,** Professor, Department of General Surgery & **Dr. Atul Mishra,** Professor, Department of General Surgery. No part of this thesis has formed the basis for the award of any degree previously.

_____

DR. PRATEEK GUPTA
Department of General Surgery
Dayanand Medical College & Hospital,
Ludhiana, Punjab

Date:

Place:

CERTIFICATE OF SUPERVISORS

This is to certify that the work incorporated in this thesis entitled **"EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** has been carried out by **Dr. Prateek Gupta** under our direct supervision. The data incorporated in this thesis is original and genuine and has been carried out by the candidate himself.

Signature of Supervisor **Signature of Co-Supervisor**

Dr. Amandeep Singh Nar
Professor
Department of General Surgery
DMCH, Ludhiana

Dr. Atul Mishra
Professor
Department of General Surgery
DMCH, Ludhiana

Date:

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Dr. Prateek Gupta
Department of General Surgery
Dayanand Medical College & Hospital,
Ludhiana, Punjab

Date:

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Dedicated

to

My Family

ACKNOWLEDGEMENT

This journey, culminating in this thesis, has been one of immense learning and growth, made possible only through the unwavering support and encouragement of a number of individuals who deserve my deepest gratitude.

First and foremost, my heartfelt gratitude goes to **my parents**, who have been my pillars of strength, their unconditional love and unwavering belief in my abilities fuelling my every endeavour. Thank you for the countless sacrifices you've made to pave my path to success. Your constant encouragement to dream big and pursue my passions with unwavering dedication has been the wind beneath my wings.

To my brother, **Prabal**, you are more than just a sibling; you are my confidant, my biggest cheerleader, and my constant source of laughter and support. Thank you for always being there to celebrate my victories and offer a listening ear during challenging times. Your presence throughout this journey has made it all the more meaningful.

This work would not have been possible without the exceptional guidance and mentorship of my esteemed guide, **Dr Amandeep Singh Nar**. Your expertise in the field has been invaluable, and your patience in guiding my research has been remarkable. Thank you for sharing your knowledge so generously and for always encouraging me to think critically and push the boundaries of my understanding.

I am equally indebted to my co-guide, **Dr. Atul Mishra**, for their insightful feedback, constructive criticism, and unwavering support. Your unique perspective and valuable suggestions have significantly enriched this research, pushing me to explore new avenues and refine my ideas.

My sincere appreciation also goes to the **faculty members of the Department of General Surgery, Dayanand Medical College and Hospital, Ludhiana** who have been instrumental in shaping my academic journey.

I would also like to extend my heartfelt appreciation to my incredible **friends and colleagues** who have enriched this journey. Your support, camaraderie, and intellectual curiosity have been invaluable. Thank you for the countless thought-provoking discussions, the shared moments of inspiration, and for always fostering an environment of collaborative learning and growth

To everyone mentioned here and to those who have played a role in this journey, however small, please know that your contributions are deeply valued and appreciated. Thank you for being an integral part of this incredible experience.

Dr. Prateek Gupta

ABBREVIATIONS

LC- Laparoscopic Cholecystectomy

CBD- Common bile duct

OC- Open Cholecystectomy

GB- Gall Bladder

ASA- American Society of Anesthesiologists

CBC- Complete Blood Count

Lfts-Liver function tests

Rfts- Renal function tests

PTI- Prothrombin index

Hba1c- Glycosylated Haemoglobin

S.Amylase- Serum Amylase

S.Lipase- Serum Lipase

ERCP-Endoscopic Retrograde Cholangiopancreatography

Mrcp-Magnetic resonance cholangiopancreatography

DMCH- Dayanand Medical College and Hospital

T2DM- Diabetes Mellitus

HTN- Hypertension

CAD- Coronary artery disease

PCOD- Polycystic Ovarian Disease

OSA- Obstructive Sleep apnea

TB- Tuberculosis

TLC- Total leukocyte counts

HMG- Hemogram

S.albumin-Serum Albumin

SGOT- Serum glutamic oxaloacetic transaminase

SGPT-Serum Glutamic Pyruvic Transaminase

ALP- Alkaline Phosphatase

ABSTRACT

Introduction- Laparoscopic cholecystectomy, a widely performed minimally invasive surgery, offers benefits like rapid recovery and shorter hospital stays. However, the complication rate, though modest, can lead to significant patient morbidity. Many of these preventable complications often occur due to inadequate preparation for a challenging operation. Addressing this researchers have developed a preoperative scoring system to help predict the difficulty of laparoscopic cholecystectomy.

Aim and objective- To Evaluate the Diagnostic Performance of a Pre-operative scale in predicting difficult Laparoscopic Cholecystectomy.

Materials & methods-This study evaluated the predictive capacity of a preoperative scale for determining the difficulty of laparoscopic cholecystectomy. The preoperative scale was compared to the intraoperative difficulty grade assigned by the surgeon. Additionally, the study collected pre-operative laboratory tests reports.

Results-The study found the preoperative scoring system accurately predicted the complexity of laparoscopic cholecystectomy. Other factors like diabetes, hypertension, serum bilirubin, and PTI were also identified as important predictors of a difficult procedure.

Conclusion-The preoperative scoring system can accurately identify patients likely to face a challenging laparoscopic cholecystectomy. This enables appropriate surgical planning and patient counselling. Surgeons can leverage this information to better prepare for the procedure, anticipate and address possible complications, and can set realistic expectations with patients regarding the surgery's difficulty and recovery timeline.

Key Words- Laparoscopic Cholecystectomy · Operative difficulty · Difficulty grading, difficult cholecystectomy ·Predictive score

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BABAFARIDUNIVERSITYOFHEALTHSCIENCES
SadiqRoad,Faridkot-151203(Pb.)INDIA
PhoneNo.91-1639-256253andFaxNo.91-1639-256234
Website:www.bfuhs.ac.in,Email:bfuhspc@gmail.com
(BFUHS–UNIVERSITYLIBRARY-CoordinatorAPC)

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Researcher: **Prateek Gupta**

Supervisor: **Dr. Amandeep Singh Nar**

Co-Supervisor: **Dr. Atul Mishra**

Research Centre: **Dayanand Medical College & Hospital, Ludhiana**

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INTRODUCTION

Gallstones is among the most common causes of abdominal pain [1,2] and the only effective management of symptomatic gallstones is Cholecystectomy. [3,4] Laparoscopic cholecystectomy is the “gold standard” in the management of symptomatic gall stone disease [5]as it has a low incidence of mortality and morbidity along with a faster recovery period. It offers decreased post-operative pain and shorter hospital stay leading to faster recovery. There is also improved cosmesis and less chance of wound complications and postoperative ileus [6]

Worldwide, LC has become one of the most frequent surgery.[7]The risk of injury to bile duct may increase up to 10 times during a difficult laparoscopic cholecystectomy, which may lead to more frequent conversion to open surgery, increased bleeding, more postoperative complications, and longer surgical time.[8] This increase in adverse outcomes shines a light on the critical importance of accurately identifying and effectively managing difficult Laparoscopic Cholecystectomies. Effectively predicting and managing these challenging cases is crucial to ensure optimal patient outcome and reduction of serious complications associated with complex Laparoscopic Cholecystectomy procedures.

Several studies showing various factorsthat can predict the difficulty of a Laparoscopic Cholecystectomy pre-operatively have been published. [9,10,11,12]Factors like advanced age, male sex, history of prior hospitalization, obesity, previous abdominal surgery, a palpable gallbladder, increased gallbladder wall thickness, impacted gall stones and the presence of pericholecystic fluid are included.

A reliable pre-operative scoring system willallow surgeons to take the proper support and resources during the procedure. Additionally, it enables surgeons to inform patients pre-operatively about the possible

challengesthey may face, allowing for better-informed consent and patient expectations. By identifying potentially difficult cases in advance, surgeons can plan accordingly, allocating additional time, specialized equipment, or even the involvement of a more experienced surgeon if needed. [13,11,14,9,15,12]

On introduction of Laparoscopic Cholecystectomy as a surgical technique,the frequency of serious complications like injury to the bile ductwas initially quite high. This was largely due to the learning curve as surgeons adapted to the new minimally invasive approach, which involved different techniques and perspectives compared to traditional open cholecystectomy. However, as laparoscopic cholecystectomy became more widely adopted and surgeons became more experienced with the procedure, the rate of serious complications, such as bile duct injuries, has steadily decreased over time. Advancements in surgical techniques, improvements in training programs, and the increasing familiarity of surgeons with the laparoscopic approach have all contributed to this decline in the occurrence of major complications.[16]

In the past, previous abdominal operations and the presence of liver cirrhosis or portal hypertension were often considered absolute contraindications to performing laparoscopic cholecystectomy. However, these limitations have largely diminished, and surgeons are more adept at managing such challenging cases using the minimally invasive laparoscopic approach.

Despite these advancements, surgeons may still occasionally encounter various technical difficulties during the laparoscopic cholecystectomy procedure. These can include challenges in insertion of ports, creating a stable pneumoperitoneum, gallbladder dissection from its attachments, or safely removing the excised gallbladder. Among the frequent reasons for converting a planned laparoscopic procedure to open, is the presence of complex anatomy in the Calot's

triangle region, where the critical cystic duct and artery are located. [8,17,18]

Various factors related to the patient, the surgical anatomy, and the clinical presentation can influence the technical difficulty and complexity of performing the surgery. For instance, old age, male gender, prior abdominal surgery, obesity, and pathological conditions such as severe inflammation of the gallbladder or impacted gallstones may pose challenges during the surgery. [12,13]Additionally, external factors like equipment failures can also contribute to the difficulty. Furthermore, the assessment of this difficulty varies between individual surgeons, depending on their experience and surgical expertise.

The intra-operative difficulty scale developed by Nassar et al. in 1995 is a commonly used scale to assess the difficulty of laparoscopic cholecystectomy.[19] This scale includes factors having possible influence on the difficulty of the procedure, including the condition and appearance of the gallbladder itself, the complexity of the cystic pedicle containing the critical cystic duct and artery, as well as the presence and extent of adhesions surrounding the gallbladder. The widespread adoption of this grading system has enabled surgeons to better plan their operative approach, allocate appropriate resources, and counsel patients on the expected difficulty of the procedure.

In recent years, the rate of conversion to open cholecystectomy has decreased substantially, dropping from a previous range of 2-15% down to only 1-6%.[17] This significant decline in conversion rates has resulted in numerous benefits, including shorter duration of surgery, less complications, decreased costs, shorter hospital stays, and decreased overall hospital charges for patients.

Converting a laparoscopic cholecystectomy to an open should not be seen as a complication, but rather a prudent decision by the operating surgeon to prioritize the patient's safety and well-being. When faced

with technical challenges or unforeseen intra-operative findings, a surgeon must not hesitate to make the transition to an open surgery.
The better identification and understanding of various patient-related, anatomical, and clinical factors, predicting the need for conversion would be invaluable in determining whether an open cholecystectomy should be performed as the initial approach, thereby avoiding the potential complications and risks of intra-operative conversion. This will improve preoperative patient counselling and help in better surgical planning, additionally this will mitigate the extra costs and other challenges associated with a conversion during a laparoscopic procedure. The ability to make this transition, when necessary, demonstrates the surgeon's experience, judgment, and commitment in providing high-quality, patient-centred care.

Laparoscopic cholecystectomy becomes more difficultin cases involving dense adhesions at Calot's triangle, a history of previous upper abdominal surgery, an acutely inflamed or gangrenous gallbladder, empyema of the gallbladder, Mirizzi's syndrome, a prior cholecystostomy procedure, or the existence of cholecystogastric or cholecystoduodenal fistulas.[20] Additionally, gallstone disease is more common in women by a factor of two to three. [21]

Developing a reliable scoring system could greatly assist surgeons in planning the optimal surgical approach, effectively counselling patients, reducing complications, lowering conversion rate, and thus decreasing overall medical costs. The challenges faced during a procedure may vary from case to case. Being able to accurately predict this difficulty is essential. While multiple scales are present which are aimed at anticipating a difficult cholecystectomy, most are based on variables like surgical time or conversion rate, which can be heavily influenced by the individual surgeon's experience. As a result, these existing scales may not be universally applicable and may have limited utility in guiding clinical decision-making. Hence the need arises for a scale that

can reliably predict the difficulty of the surgery pre-operatively, irrespective of the surgeon's skill level. [22,10,11,12]

The study’s objective is to evaluate the diagnostic performance of a pre-operative scoring system in accurately predicting the difficulty of Laparoscopic Cholecystectomy procedures. The scoring system will be based on the clinical and radiological factors identified in the literature as potential predictors of a difficult Laparoscopic Cholecystectomy.

AIM AND OBJECTIVE

- To Evaluate the Diagnostic Performance of a Pre-operative scale in predicting difficult Laparoscopic Cholecystectomy

REVIEW OF LITERATURE

A Florentine pathologist, Antonio Benivieni, provided one of the earliest recorded accounts of gall bladder stones in humans, describing a case involving a patient who died from abdominal pain in 1420. This early documentation was momentous in the understanding of this medical condition. In subsequent years, biliary colic was recognised as a painful condition caused by the presence of gallstones.

In 1658, the renowned English physician **Francis Glisson** not only described the liver capsule, but he also published his experiences with agonizing biliary colic attacks. Glisson poignantly described these painful episodes as having "no release except by death", highlighting the severe suffering endured by those afflicted with gallstone related disorders in that era.

These early accounts highlight the long-standing history and medical significance of gallstone-related disorders.

The first interaction between gallstones and surgical intervention was by chance. **In 1684**, A Dutch Surgeon, **Von der Wiel**,[23] gave the first incision of the anterior abdominal wall to drain bile in one of his patient suffering from an intra abdominal abscess caused by gangrenous cholecystitis with gallstones. This early surgical intervention marked a significant milestone in evolution of cholecystectomy procedures.

Langenbuch who was the Director of the Lazarus Hospital in Berlin, had a unique position that allowed him to attend to both surgical and medical issues. Langenbuch had two key insights: Gallbladder is not essential to life as shown in previous animal studies, and his medical colleagues believed the gallbladder caused gallstones. After extensive cadaveric studies, Langenbuch developed the cholecystectomy technique.

Using a sub-costal incision, he performed the surgery similar to modern practices. In **1882, Langenbuch** successfully removed the gallbladder of a 43-year-old patient. The patient was in poor health, had lost 80 pounds and became addicted to morphine. However, after preparation, the procedure was completed without incident. Langenbuch found two cholesterol stones and an inflamed, thickened gallbladder. The next day, the patient felt great - no fever, no pain, and was even able to enjoy a cigar. Within 12 days, the patient was up and about, and left the hospital 6 weeks later having regained weight and experienced no further issues.[23]

These early pioneers laid the foundations of modern cholecystectomy techniques.

Müheis is credited with performing the first LC in 1986[24] The history of LC is a fascinating tale of innovation and evolution. While laparoscopy itself had earlier roots in gynaecology, its application to gallbladder removal marked a turning point in general surgery.[24]Credits to surgeons like **Philippe Mouret and François Dubois**for pioneering early LC techniques in France, moving from "mini-laparotomy" approaches towards the video-assisted procedures we recognize today. This shift, coupled with the work of surgeons like **Jacques Perissat** who championed and disseminated the procedure, led to LC's rapid acceptance and fuelled the broader laparoscopic surgery revolution.

In September 1992, the consensus conference held in Bethesda, Maryland inferred that the laparoscopic cholecystectomy was the preferred treatment for cholelithiasis.[25]The conference cited numerous advantages of laparoscopic procedure over traditional open cholecystectomy. This landmark consensus statement helped propel the widespread adoption of LC as a “standard of care procedure” for gallbladder removal.

The article "Laparoscopic Cholecystectomy: The New 'Gold Standard'?"[26] reported on the authors' experience with laparoscopic cholecystectomy and arguing for its adoption as the “preferred treatment for symptomatic gallstones”. From 647 patients referred for cholecystectomy only 4.5% underwent traditional open cholecystectomy, while LC was attempted in 95.5% of cases and successfully completed in 97.1% of those attempts.

The authors highlighted the safety and efficiency of LC, noting a low rate of technical complications (0.5%) and major complications (1.6%), with no perioperative mortality. They also emphasized the benefits of LC for patients, including a mean post-operative hospital stay of just one day and a rapid return to normal activity.

The authors concluded that “LC is a safe and effective alternative to open cholecystectomy”, offering significant advantages for patients. They proposed that LC should be considered the "gold standard" therapy for managing symptomatic cholelithiasis.

In a **1995 study, Nassar et al**. investigated the viability of performing laparoscopic cholecystectomies without video assistance, a novel approach during a time when the relevant technology was still emerging and financially inaccessible. The researchers examined their findings, the historical context of their investigation, and the significance of their research to contemporary surgical practice. Recognizing the limitations of existing techniques, the researchers tried LC without relying on video imaging systems. They successfully completed laparoscopic cholecystectomy on 7 out of 10 patients using their technique, resorting to video assistance only in the remaining cases. Based on a difficulty grading system they developed, known as the "Nassar Classification," the authors suggest that approximately 80% of procedures could be performed using their technique. This classification system categorizes procedures based on factors such as gallbladder adherence, cystic pedicle complexity, and adhesions, providing a framework to assess and to predict difficulty of each case. The researchers' innovative approach and the Nassar Classification

system demonstrate their efforts to expand the accessibility and feasibility of laparoscopic cholecystectomy, which represented a significant advancement in the field of gallbladder surgery at the time.[19]

Table 1: Intra operative Score (Nassar Classification)

Grade 1:	**Grade 2:**
Gallbladder: floppy, non-adherent *Cystic pedicle*: thin and clear *Adhesions*: Simple up to the neck/Hartmann's pouch	*Gallbladder*: Mucocele, Packed with stones *Cystic pedicle*: Fat laden *adhesions*: Simple up to the body
Grade 3:	**Grade 4**:
Gallbladder: Deep fossa, Acute cholecystitis, Contracted, Fibrosis, Hartmans adherent to CBD, Impaction *Cystic pedicle*:Abnormal anatomy or cystic duct short, dilated or obscured *Adhesions*:Dense up to fundus; Involving hepatic flexure or duodenum	*Gallbladder*: Completely obscured, Empyema, Gangrene, Mass *Cystic pedicle*: Impossible to clarify *Adhesions*:Dense, fibrosis, wrapping the gallbladder, Duodenum or hepatic flexure difficult to separate

In a **1996 study, Kum et al,** showed the higher rate of conversion to open surgery in patients with inflamed gallbladder. This suggests that the difficulties encountered while operating on an inflamed gallbladder can make the laparoscopic approach more challenging. However, the inflamed gallbladder group experienced better postoperative recovery, though they also had a higher frequency of CBD injury. This highlights the trade-offs involved in managing more complex cases of acute cholecystitis through minimally invasive techniques. [27]

In **1996 Liu et al**. [28] retrospectively analysed data in 500 patients who underwent LC from March 1991 to July 1994 in a tertiary hospital. The study meticulously examined a range of variables. This comprehensive approach aimed to pinpoint specific predictors of converting the procedure to open surgery.

They found that, patients older than 65 years, obese, those with history of acute cholecystitis, thickened gallbladder walls on preoperative ultrasound, and those being operated on during the surgeons' early learning phase had higher chance of being converted to open surgery. Interestingly, factors like sex, previous lower abdominal surgery, pancreatitis or cholangitis, did not significantly influence conversion rates.

The authors demonstrated that conversion from LC to open surgery is influenced by a complex interplay of patient-related factors, disease presentation, preoperative findings, and surgical experience. This conclusion carries significant implications for surgical practice, highlighting the importance of optimising patient selection, detailed preoperative assessment, and the continuous improvement of laparoscopic skills to minimize the conversion to open surgery and optimize patient outcomes.

The study's findings, despite their historical context, remain relevant to contemporary surgical practice and emphasize the significance of several key factors:[29]

Preoperative Risk Evaluation: Comprehensive patient assessment to identify potential challenges is important. Recognizing high-risk patients, such as the elderly, obese individuals, or those with a history of acute cholecystitis or previous abdominal surgeries, enables informed consent, allocation of appropriate resources, and the assignment of the procedure to a more experienced surgeon capable of managing complex scenarios.

Patient Counselling: Discussing factors increasing the individual risk, such as age, obesity, or the condition of their gallbladder, can help manage patient expectations and ensure they have realistic outcomes, which in turn promotes shared decision-making.

Surgical Training and Experience: The study's findings highlight the significant impact of surgical expertise on conversion rates. Continuous surgical education, mentorship programs, and the adoption of simulation-based training can assist surgeons in refining their laparoscopic skills and developing the necessary decision-making capabilities to manage challenging scenarios more effectively. Investing in the ongoing professional development of surgical teams is essential for optimizing patient outcomes.

Technical Advancements: Continuous improvements in laparoscopic equipment, imaging modalities, and surgical techniques have significantly enhanced the efficacy of laparoscopic cholecystectomy. Staying informed about these technical advancements can further minimize the necessity for conversion to open surgery, leading to improved patient outcomes and reduced healthcare costs.

In conclusion, this study provides a valuable historical perspective on the factors influencing conversion during laparoscopic cholecystectomy. While surgical practice has evolved, the core principles of optimal patient selection, detailed preoperative assessment, and ongoing surgical improvement remain paramount in minimizing the requirement for conversion and optimizing patient outcomes.

The study **"Laparoscopic Cholecystectomy for Acute Cholecystitis: Prospective Trial" by Eldar ae al** [30] investigated the efficacy of laparoscopic cholecystectomy in treating acute cholecystitis. Researchers observed 53 patients undergoing LC for this condition. The results showed that LC was successful in most cases (94%), with only a small percentage requiring conversion to open surgery (6%). Importantly, the study found a low complication rate (7.5%) and no deaths associated with the procedure. Based on these findings, the authors concluded that LC is a “safe and effective treatment” for acute cholecystitis. They highlighted the advantages of LC, such as smaller incisions, reduced hospital stays, and faster recovery times compared to traditional open surgery. The authors even suggested that LC should

be the method of choice for treating acute cholecystitis, even in cases with more severe inflammation.

Kama et al in 2001[31] sought to identify explicit factors that increase the chances of converting to an open surgical procedure. After analysing data from 1000 patient cases in whom LC was done, the researchers pin-pointed several significant predictors of conversion.
Male patients, when compared to female patients, showed a higher tendency for conversion. A history of previous abdominal surgeries also raised the conversion rate, likely due to adhesions from prior procedures, which can complicate the laparoscopic approach. Obesity emerged as another significant factor, possibly due to the challenges in visualization and surgical access within the abdomen for obese individuals. A history of jaundice was linked to increased conversion rates, suggesting a potential correlation with more complex biliary anatomy that can hinder the laparoscopic procedure. As expected, acute cholecystitis significantly increased the conversion rate, likely due to the inflammation and adhesions that can complicate the laparoscopic approach. Thickened gallbladder walls, as observed on preoperative ultrasounds, also emerged as a strong predictor of conversion, indicating chronic inflammation and potential difficulties in performing the dissection of Gallbladder. Finally, the presence or even suspicion CBD stones significantly elevated the conversion rate, as this often necessitates more complex surgical procedures beyond a straightforward cholecystectomy.[32]

Lam CM, Murray FE, and Cuschieri A [7] conducted a survey in 1996 to determine the impact of LC on the rates of cholecystectomy procedures in Scotland. They found that rate of total cholecystectomy rose by 18.7% in only 4 years. LC became the preferred surgery in all age groups.

In a 1998 study, Lujan et al. [33] presented a prospective comparison of LC versus open cholecystectomy in the management of acute cholecystitis. This was conducted at the "Virgen de la Arrixaca" University Hospital in Spain. The choice between LC and OC was determined by the surgeon's level of experience in laparoscopic surgery.The primary purpose was to compare the two surgical approaches for operating time, conversion rate, complications. The results showed that while LC had a longer operating time but had significantly shorter hospital stay. The rate of conversion from LC to OC was 15%.The authors concluded that “LC is a safe and effective alternative to OC for the treatment of acute cholecystitis”, offering benefits like more comfortable postoperative recovery and shorter hospital stay.

In **2005 Benjie Tang, Alfred Cuschieri**,[34] delved into the factors contributing to conversions to OC and the impact of these conversions on patients. The authors analysed a substantial body of literature published between 1990 and 2005, encompassing various study designs. They identified various risk factor and also pointed to the surgeon's learning curve as a contributing factor. They suggest that resident surgeons require more than 200 cases to achieve proficiency in LC, highlighting the importance of careful case selection during training to minimize conversions. They found certain patient and disease-related factors clearly increased the chances of conversion. They advocate predictive scoring systems based on the risk factors, particularly in training settings, to guide case selection and potentially reduce conversion rates.

In a **2009 study, Randhawa and Pujahari**[11] developed a scoring system to help in predicting the difficulty level of laparoscopic cholecystectomy. They identified several key factors, which included sex, age, history of hospitalization, clinical factors, and sonographic findings. They also noted that old age and male gender predisposed the patient to an increased chance of conversion. Additionally, the

patients with high BMI had a higher rate of conversion (6.2%) when compared to the overall rate of 5.4%. Acute cholecystitis in obese individuals was found to be the most significant factor contributing to conversion. Even a history of a previous acute attack requiring hospitalization was found to make the surgery more difficult. The researchers noted a higher incidence of bleeding, ductal injury, and subsequent conversion in cases of acute cholecystitis. The study also confirmed that a thickened gallbladder wall was an important predictor of conversion. Furthermore, a history of any upper abdominal surgery led to high conversion rate of 37.5%, likely because of dense adhesions from the previous procedure. However, the authors highlighted that with advanced laparoscopic techniques and increased experience, reduced the frequency of conversion.

In **2013,[12] Gupta N et al** found that history of hospitalization, palpable gall bladder, impacted stone and GB wall thickness were useful in predicting difficult laparoscopic cholecystectomy. They noticed being older than 60, male, obese, having acute cholecystitis with a palpable GB and thickened GB wall was linked to increased chance of conversion.

In 2015 GoonawardenaJ,et al[35]developed a tool for predicting the necessity to convert a laparoscopic cholecystectomy to an open procedure before surgery. This is important because while LC is generally preferred, certain factors can make it more challenging and riskier, necessitating conversion for patient safety. Data from 732 patients was analysed. Out of these, 47 (6.4%) were converted to open surgery. They investigated 40 different pre-operative risk factors, using statistical methods (multivariate logistic regression) to identify those most strongly linked to conversion.

Five key risk factors were identified:

Previous upper abdominal surgery: This had the strongest association, increasing the odds of conversion.

Obesity (BMI > 30 kg/m2): The risk was more than in non-obese patients

Visible choledocholithiasis: The presence of calculi in the CBD increased the risk.

Impacted stone at the gallbladder neck: This increased the odds of conversion.

Gallbladder wall thickness: For every millimetre increase in thickness, the risk of conversion increased.

Based on these findings, the researchers developed four probability nomograms, which allow surgeons to estimate the likelihood of conversion for individual patients based on their specific risk factors. The nomograms were validated and showed high accuracy in predicting conversion. They found that some of the patients will continue to require open surgery for safe completion and presented four evidence-based nomograms as a practical individual risk stratification tool predicting the chances of conversion to open based on pre-operative settings. This study provides a valuable tool for surgeons planning cholecystectomies.

By assessing pre-operative risk factors and using the nomograms, surgeons can: Better inform patients about the potential need for conversion, optimize resource allocation and surgical scheduling, Triage patients benefiting from a primary open approach, especially in training settings**.**

Overall, this study contributes to improving patient safety and surgical outcomes in cholecystectomy.

In **2015 SippeyM**[36] et al investigated the factors that might increase the likelihood of needing to convert LC to open in patients with acute cholecystitis. The researchers used data published by American College of Surgeons, focusing on patients who underwent LC due to

acute cholecystitis between 2005 and 2011. They compared the characteristics and outcomes of subjects who successfully underwent LC with those needing conversion to open surgery. The study found that 6% of the subjects studied needed conversion.

Various factors were identified with an increased frequency of conversion:

Older age: Patients who needed the conversion to open surgery were significantly older.

Higher BMI: Higher BMI patients had an increased chance for conversion.

Presence of certain medical conditions: Patients with a range of underlying health issues, including vascular, cardiac, renal, pulmonary, neurological, and hepatic diseases, diabetes and bleeding disorders, had more chances of undergoing conversion from the planned laparoscopic approach to open cholecystectomy surgery. These co morbidities appeared to compound the technical difficulty and risks related to minimally-invasive laparoscopic procedure. The authors concluded that while LC is a common and generally safe procedure for acute cholecystitis, certain pre-existing conditions and patient characteristics can enhance the risk of conversion.

In **2017 Griffiths et al**[37] focused on requirement of a standardized system to classify the difficulty level of LC. The authors argued that such a system would improve the consistency of reporting surgical findings and patient outcomes, which is crucial for auditing, training, and research. The researchers aimed to validate a specific difficulty grading system known as the Nassar scale. They tested its applicability and consistency using two large sets of patient data: one from a multi-center study with 8820 patients and another from a single-surgeon series with 4089 patients. The study found a strong correlation between the Nassar scale's difficulty grades [19] and patient outcomes in both datasets.

Higher difficulty grades consistently predicted worse outcomes, including:

Longer hospital stays: The median length of hospital stay increased with each difficulty grade, ranging from a median of 0 days for the lowest difficulty grade to 4 days for the highest difficulty grade.

Higher complication rates: The 30-day complication rate increased significantly with higher difficulty grades, ranging from 7.6% for the lowest difficulty grade to 24.4% for the highest difficulty grade.

Higher 30-day mortality: While the association was not much significant, there was a correlation between higher difficulty grades and an increased rate of mortality within 30 days of the surgical procedure.

The researchers concluded that the Nassar scale was a reliable and valid tool for grading the difficulty of laparoscopic cholecystectomy procedures. They highlighted the scale's significant potential benefits:

Standardizing reporting: The Nassar scale allows for more consistent descriptions of operative findings across different surgeons and institutions, improving the quality and comparability of data. Facilitating audit and training: The framework provided by the Nassar scale enables more effective evaluation of surgical performance and identification of areas for improvement, both in individual practices and across the field.

Enhancing research: The Nassar scale's ability to reliably categorize the complexity of cases enables more meaningful comparisons of surgical outcomes based on the difficulty of the procedures, leading to more robust and informative research.

The Nassar scale was particularly accurate in predicting the need to conversion from LC to open surgery, especially in the CholeS cohort, where higher difficulty grade had a greater likelihood of converting to an open procedure.

Overall, the study emphasizes the importance of using a standardized difficulty grading system like the Nassar scale to improve the quality and safety of laparoscopic cholecystectomy.

In **2017 Siddiqui M, Rizvi S**[38]developed a scoring system based on seven ultrasound findings: gallbladder wall thickness, gallbladder transverse diameter, presence of impacted stones, common bile duct diameter, presence of fluid collection around the gallbladder, number of stones, and liver size. Each factor was allocated points based on its association with surgical difficulty.

The study found that this ultrasound scoring system effectively predicted the chances of a difficult LC. Patients with worse score had longer operating times, increased complications, and an increased conversion rates. This scoring system provides surgeons with a valuable tool to assess the potential difficulty of LC preoperatively using readily available ultrasound imaging. This permits for better planning, informed consent, and potentially choosing alternative surgical approaches for higher-risk patients.

In a **2017 systematic review, Yew et al**. [39] examined 30 English-language studies to identify the various factors associated with converting laparoscopic to open cholecystectomy. They found a credible association between several frequently reported factors and requirement of conversion to open surgery. The authors concluded that prediction risk scores or nomograms may be the most helpful tool for clinicians to stratify the risks in a given clinical scenario. By utilizing such prediction tools, clinicians can optimize patient care and management.

In **2019, Nassar et al**. [40] developed and validated a pre-operative scoring system to predict the difficulty of laparoscopic cholecystectomy procedures. The researchers identified eight pre-operative variables associated with increased surgical difficulty: advanced age, higher ASA classification, male gender, diagnosis of common CBD or acute cholecystitis, thick-walled gallbladder, dilated CBD, the need for pre-operative endoscopic retrograde cholangiopancreatography, and non-elective surgical cases. Based on these risk factors, the researchers created a pre-operative risk score where each factor was assigned a

specific number of points based on its association with surgical complexity. The study demonstrated that this pre-operative risk scoring system accurately predicted the likelihood of a difficult LC. Ultimately, this risk stratification can lead to improved patient care and surgical outcomes through better preoperative planning and informed decision-making.

In **2021, Goyal, Muthuraman, and Sharma**[41] updated the scoring system given by Randhawa and Pujahari, which now included two additional risk factors- endoscopic retrograde cholangiopancreatography and diabetes mellitus. By incorporating these two new variables, in addition to the previously established factors, the modified score aims to provide a more comprehensive and accurate preoperative assessment of the anticipated surgical complexity.

MATERIAL AND METHODS

DATA SOURCE

This prospective observational study was conducted at DMCH over a one-year period from September 2022 to September 2023. Total 244 Patients admitted to DMCH and listed for Laparoscopic Cholecystectomy were included.

METHOD OF COLLECTION OF DATA

Total of 244 patients planned for LC (laparoscopic cholecystectomy) were enrolled in the study using the following inclusion/exclusion criteria.

Inclusion Criterion

- Patient undergoing Laparoscopic Cholecystectomy in Dayanand Medical College and Hospital.

Exclusion Criterion

- Patient unfit for anaesthesia
- Conversion to open procedure due to equipment failure

Data Collection-

The preoperative risk assessment scale proposed by Nassar et al[40]. was employed to evaluate likelihood of a LC. The scale accounted for the patient's medical history, ASA score, sonographic findings, primary diagnosis, and type of hospital admission. Additionally, preoperative data CBC,LFTs, Serum Creatinine, previous upper abdominal surgery, Co-morbidities, Coagulation Profile, Hba1c, serum amylase, and serum lipase levels were documented.

Table 2: Pre operative risk score

Variable	Points
Age	
<40	**0**
>40	**1**
Gender	
Female	**0**
Male	**1**
ASA Classification	
1	**0**
2	**1**
3	**2**
4	**7**
Primary Diagnosis	
Pancreatitis	**0**
Biliary colic	**0**
Choledocholithiasis	**1**
Cholecystitis	**4**
Thick-walledGB (>3mm)	
No	**0**
Yes	**2**
CBD Dilation (>6mm)	
No	**0**
Yes	**1**
ERCP	
No	**0**
Yes	**1**
Type of Admission	
Elective	**0**
Delayed	**1**
Emergency	**2**

Score according to pre operative findings

Low risk: 0-1

Intermediate risk: 2-6

High risk: 7-19

Patients were preoperatively stratified into low, medium, and high-risk categories on the basis of risk assessment scale developed by Nassar et al [40]. This was then compared to the grade assigned by the surgeon operating on the case, using the Laparoscopic Cholecystectomy Difficulty Scale proposed by Nassar.

Table 3:Intra operative Score (Nassar Classification)

Grade 1:	**Grade 2:**
Gallbladder: floppy, non-adherent *Cystic pedicle*: thin and clear *Adhesions*: Simple up to the neck/Hartmann's pouch	*Gallbladder*: Mucocele, Packed with stones *Cystic pedicle*: Fat laden *Adhesions*: Simple up to the body
Grade 3:	**Grade 4**:
Gallbladder: Deep fossa, Acute cholecystitis, Contracted, Fibrosis, Hartmans adherent to CBD, Impaction *Cystic pedicle*: Abnormal anatomy or cystic duct short, dilated or obscured *Adhesions*: Dense up to fundus; Involving hepatic flexure or duodenum	*Gallbladder*: Completely obscured, Empyema, Gangrene, Mass *Cystic pedicle*: Impossible to clarify *Adhesions*: Dense, fibrosis, wrapping the gallbladder, Duodenum or hepatic flexure difficult to separate

Laparoscopic cholecystectomy was performed by insufflating carbon dioxide gas into the peritoneal cavity to create a working space for the procedure. A standard configuration of two 10mm ports and two 5mm

ports was used. The Veress technique, a method of safely inserting a Veress needle into the abdomen, was employed to establish the pneumoperitoneum. Following the surgery, the operating surgeon assigned an intraoperative difficulty grade using the Laparoscopic Cholecystectomy Difficulty Scale developed by Nassar.

Statistical Analysis

SPSS version 26 was used for data analysis. Descriptive statistics encompassed measures of central tendency, dispersion, and frequency distributions. Comparative assessments between groups employed paired t-tests and chi-square analyses. The threshold for statistical significance was established at $p < 0.05$.

OBSERVATION AND RESULTS

This present prospective and observational study was conducted at DMCH from September 2022 to September 2023. All patients admitted to DMCH who were listed for LC were included in this study.

Age-

The age distribution of patients enrolled in this study spanned a wide range, from as young as 15 years old up to 82 years. Average age was 47.99 years, median age was 48 years and a mode (most common age) of 38 years.

The preoperative risk scoring system employed 40as the threshold, with 80 patients under 40 and 164 patients over 40 years old.

Table 4: Distribution of patients according to age

Age	Number of patients	Percent
<40	80	32.8
40-49	47	19.3
50-64	87	35.7
65+	30	12.3
Total	244	100.0

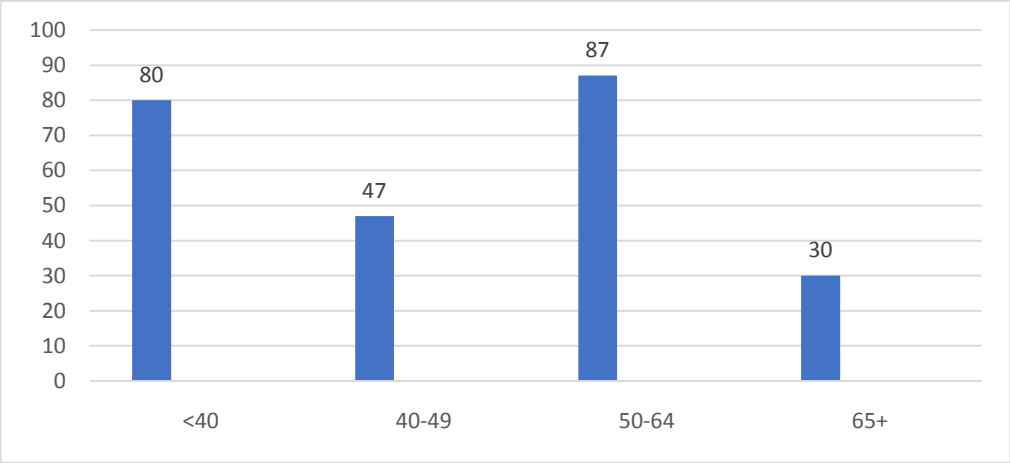

Figure 1: Graph showing distribution of patients according to age

Table 5: Relationship between age and intra operative scale

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
AGE GROUP	< 40	34	60.7%	23	26.7%	16	27.1%	7	16.3%	80	27.422	0.001
	> 40	22	39.3%	63	73.3%	43	72.9%	36	83.7%	164		
Total		56	100%	86	100.0%	59	100.0%	43	100.0%	244		

Importantly, the study found a statistically significant **p-value of <0.001**, indicating that patient age is a highly reliable preoperative factor for identifying the likelihood of a difficult laparoscopic cholecystectomy procedure.

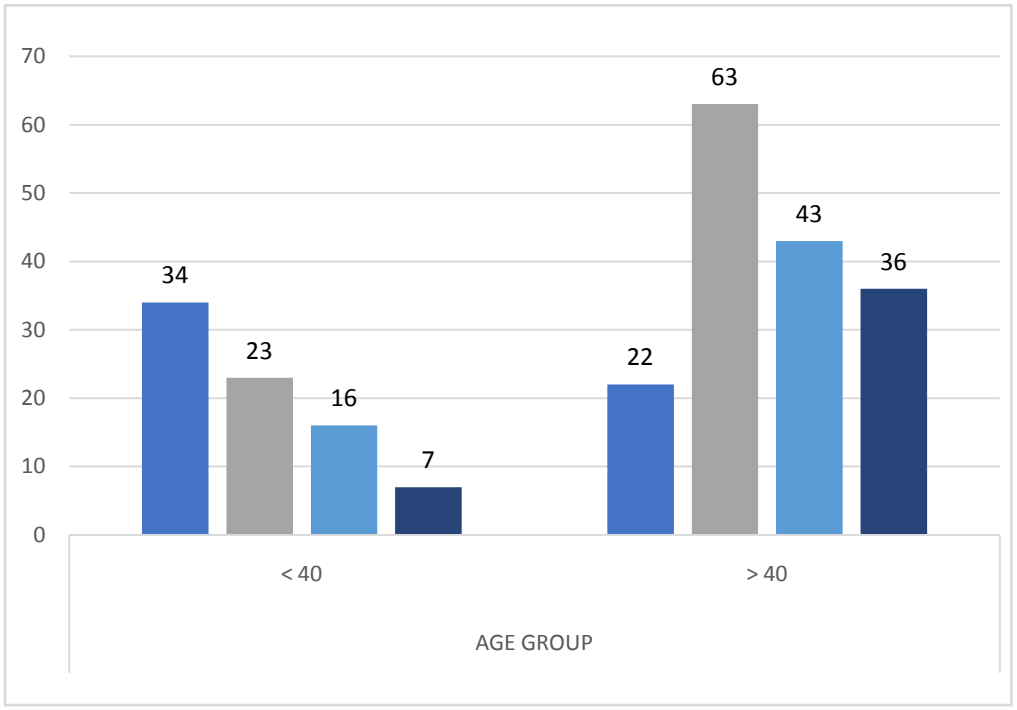

Figure 2: Distribution of patients in two groups (<40 age group, >40 age group)

We found that even though only 80 patients were below the age of 40, this group had higher number of Grade 1 (34) cases as compared to those > 40 which only had 22 out of 164 cases as Grade 1.
Similarly, we can see 36 Grade 4 cases in > 40 age group as compared to only 7 in less than 40 age group.

The data analysis revealed an increasing trend in the mean age of patients as it increased from an average age of 38.38 in case of Grade 1, 49.33 in case of Grade 2, 50.54 in case of Grade 3 and to 54.35 in case of Grade 4.

Table 6: Mean age and intra-operative grade

	Grade 1	Grade 2	Grade 3	Grade 4	p-value
Mean Age	38.38	49.33	50.54	54.35	0.000

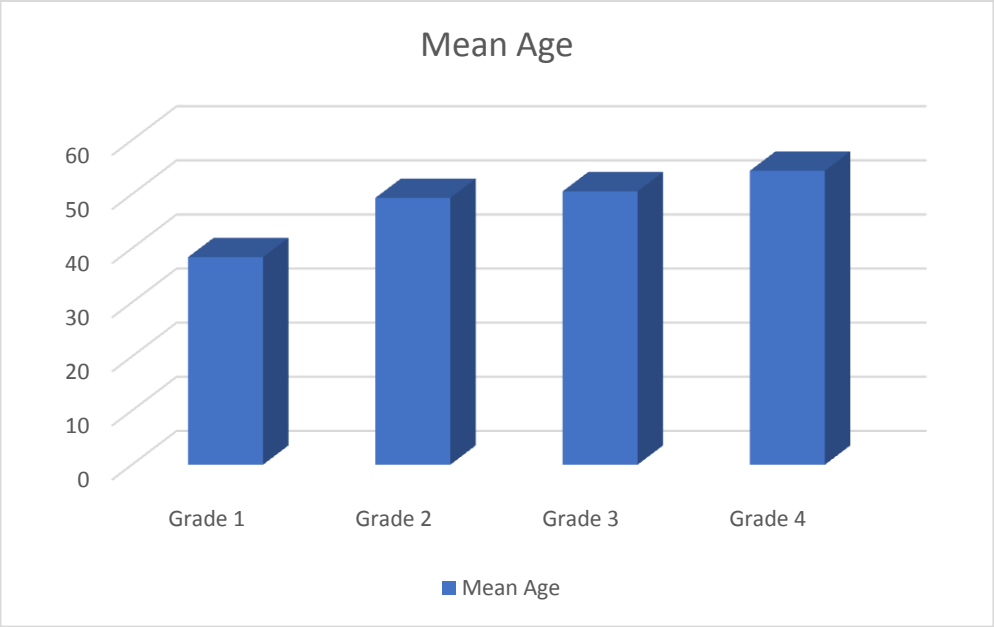

Figure 3: Mean age and intra-operative grade

Gender-

This study enrolled 244 subjects, with 171 females (70.1%) and 73 males (29.9%). With a **p-value of 0.53**, the patient's gender was not a reliable or significant predictor of the difficulty level in performing the laparoscopic cholecystectomy procedures.

Table 7: Distribution of patients according to gender

Gender	Number of cases	Percent
Female	171	70.1
Male	73	29.9
Total	244	100.0

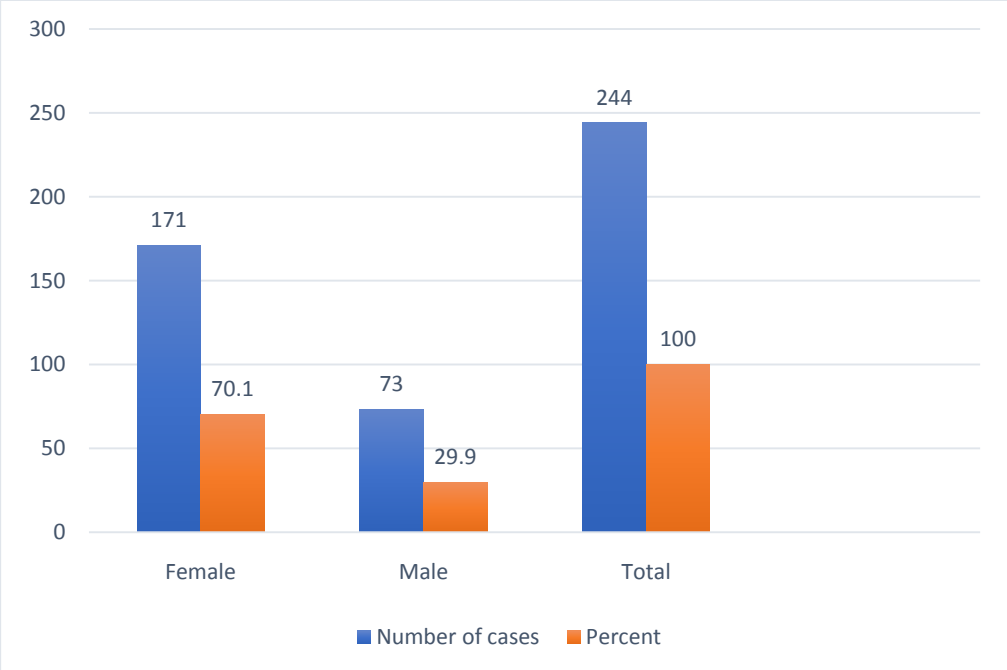

Figure 4: Distribution of patients according to gender

Table 8: Relationship between gender and intra-operative grading

	Intra-Operative Scale	**Grade 1**		**Grade 2**		**Grade 3**		**Grade 4**		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
Sex	Female	47	83.9%	59	68.6%	36	61.0%	29	67.4%	171	7.666	0.053
	Male	9	16.1%	27	31.4%	23	39.0%	14	32.6%	73		
Total		56	100%	86	100%	59	100%	43	100%	244		

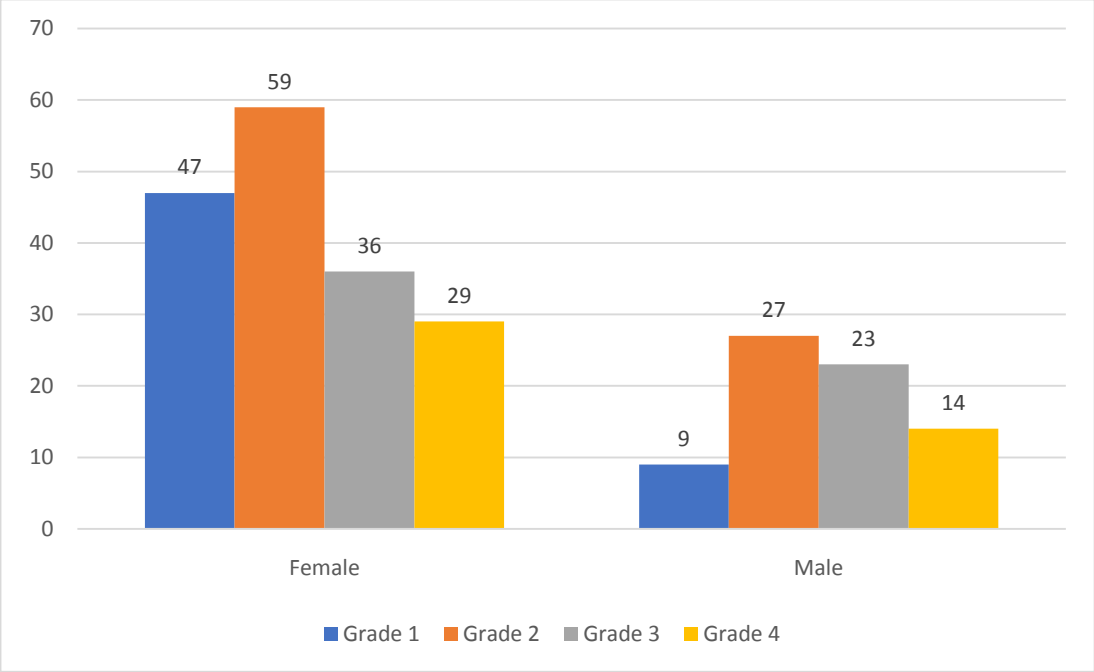

Figure 5: Relationship between gender and intra-operative grading

Table 9: Number of Laparoscopic Cholecystectomy converted to open Cholecystectomy

Sex	Laparoscopic Cholecystectomy	Open Cholecystectomy	Total
Female	168(98.2%)	3 (1.75%)	171
Male	72(98.63)	1(1.36%)	73
	240	4	244

Out of the 244 participants who underwent laparoscopic cholecystectomy as part of this study, 4 cases (1.64%) required conversion to an open surgical approach. Of these 4 converted cases, 3 were in female patients, representing a conversion rate of 1.75% among the 171 female participants. In contrast, there was only 1 converted case among the 73 male patients, equating to a lower conversion rate of 1.36% for the male cohort.

Table 10: ASA score and its relationship with intra-operative score

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
ASA Score	1	42	75.0%	22	25.6%	28	47.5%	5	11.6%	97	65.403	0.001
	2	12	21.4%	48	55.8%	19	32.2%	19	44.2%	98		
	3	2	3.6%	16	18.6%	12	20.3%	18	41.9%	48		
	4	0	0.0%	0	0.0%	0	0.0%	1	2.3%	1		
Total		56	100.0%	86	100.0%	59	100.0%	43	100.0%	244		

ASA score-

An ASA score of 1, 2, 3, or 4 was given to the patient prior to the surgical procedure. Data analysed demonstrated a**p-value of <0.001**. This metric is a highly reliable and valuable predictor of the anticipated difficulty level of the laparoscopic cholecystectomy.

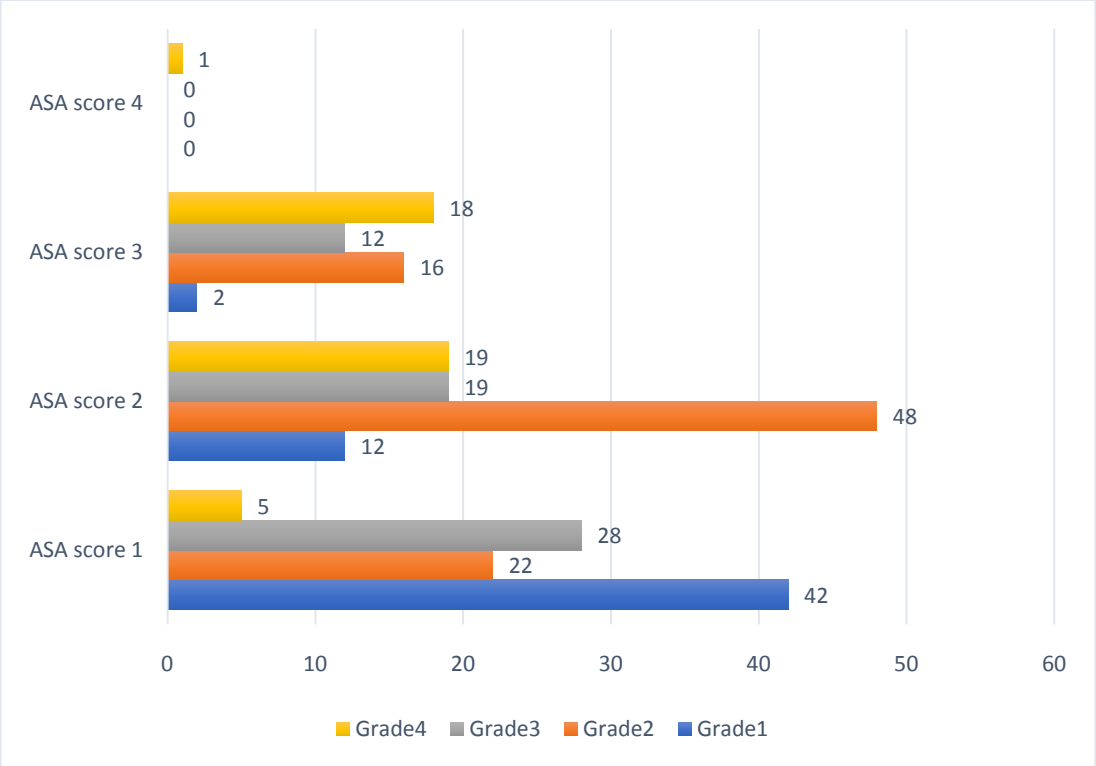

Figure 6: ASA score and its relationship with intra-operative score

The data presented provides a detailed account of the distribution of ASA scores across different patient grades. Specifically, 97 patients had an ASA score of 1, with the majority belonging to Grade 1, 22 to Grade 2, 28 to Grade 3, and only 5 to Grade 4. For patients with an ASA score of 2, there were 98 in total, with 12 belonging to Grade 1, 48 to Grade 2, 19 to Grade 3, and 19 to Grade 4. It was found that in Patients with an ASA score of 3, 2 were from Grade 1, 16 from Grade 2, 12 from Grade 3, and 18 from Grade 4. Additionally, there was a single patient with an ASA score of 4, which belonged to Grade 4.

Primary Diagnosis-

The primary diagnosis among the patients included Biliary Colic, Cholecystitis, Choledocholithiasis, and Pancreatitis. 137 cases with primary diagnosis of biliary colic, 68 cases of primary diagnosis of cholecystitis, 14 cases of choledocholithiasis and 25 cases of pancreatitis were there.

The analysis found that the primary diagnosis is a statistically significant predictor of surgical difficulty, showing **a p-value of 0.001**.

Table 11: Relationship between Primary Diagnosis and intra operative scale

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
Primary Diagnosis	Biliary Colic	51	91.1%	64	74.4%	19	32.2%	3	7.0%	137	95.362	0.001
	Cholecystitis	0	0.0%	6	7.0%	26	44.1%	36	83.7%	68	114.738	0.001
	Choledocholithiasis	3	5.4%	3	3.5%	7	11.9%	1	2.3%	14	5.839	0.119
	Pancreatitis	2	3.6%	13	15.1%	7	11.9%	3	7.0%	25	5.598	0.133
Total		56	100%	86	100%	59	100%	43	100%	244	135.111	0.001

The data showed that among 244 cases, Biliary Colic was the primary diagnosis in 137 patients. The majority of these Biliary Colic patients were either Grade 1 (51 cases) or Grade 2 (64 cases), while Grade 3 had 19 cases and Grade 4 had 3 cases.

In the case of Cholecystitis, there were 68 cases.With Grade 3 and Grade 4 having the majority at 26 and 36 cases, respectively. There were 6 Grade 2 cases, but no Grade 1 cases.

Choledocholithiasis had only 14 cases, with 3 cases each from Grade 1 and Grade 2, 7 cases from Grade 3, and only 1 case from Grade 4.

Additionally, there were 25 cases of Pancreatitis, with the maximum number (13 cases) in Grade 2. This was followed by 7 cases in Grade 3, while Grade 1 and Grade 4 had 2 and 3 cases, respectively.

Type of Admission-

Type of admission was between, emergency, delayed and elective. This study found that the type of admission is a statistically significant predictor of difficulty in LC, with a **p-value of 0.001**.

Table 12: Relationship between Type of Admission and intra operative scale

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
Type of Admission	Delayed	16	28.6%	46	53.5%	30	50.8%	21	48.8%	113	9.468	0.024
	Elective	38	67.9%	37	43.0%	20	33.9%	3	7.0%	98	46.866	0.001
	Emergency	2	3.6%	3	3.5%	9	15.3%	19	44.2%	33	51.924	0.001
Total		56	100.0%	86	100.0%	59	100.0%	43	100.0%	244	68.847	0.001

The data indicates that for elective cases, the majority were classified as Grade 1(38 cases) or Grade 2(37 cases), with 20 cases designated as Grade 3 and 3 as Grade 4. In the context of delayed admissions, a total of 113 patients were documented, with Grade 2 cases being the most prevalent at 46, followed by 30 Grade 3 cases and 21 Grade 4 cases. Notably, there were only 16 Grade 1 cases among the delayed admissions. Furthermore, in 33 emergency admissions, 19 were classified as Grade 4, 9 as Grade 3, 3 as Grade 2, and only 2 as Grade 1.

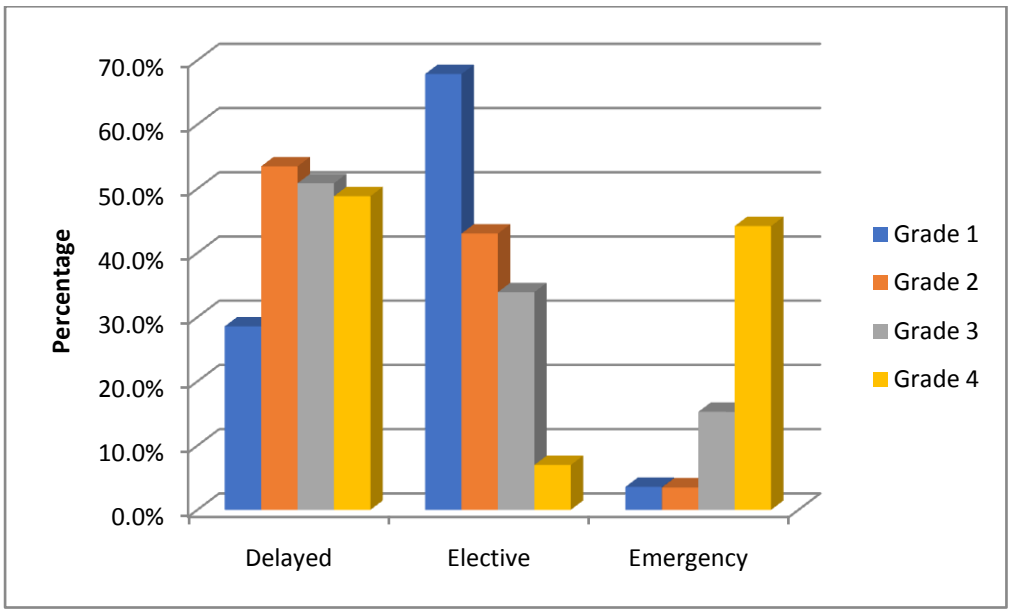

Figure 7: Relationship between Type of Admission and intra operative scale

Ultrasound/MRCP findings-

GB wall thickness

Of the total 244 patients included, 67 cases had a positive finding for thick-walled gallbladder. The data analysis revealed a **p-value of <0.01**, indicating a strong correlation between presence of a thick-walled gallbladder and the likelihood of encountering a difficult laparoscopic cholecystectomy procedure.

Table 13: GB wall thickness and intra-operative score

GB wall thickness(>3mm)	Grade 1	Grade 2	Grade 3	Grade 4	Total
Yes	3	12	20	32	67
No	53	74	39	11	177

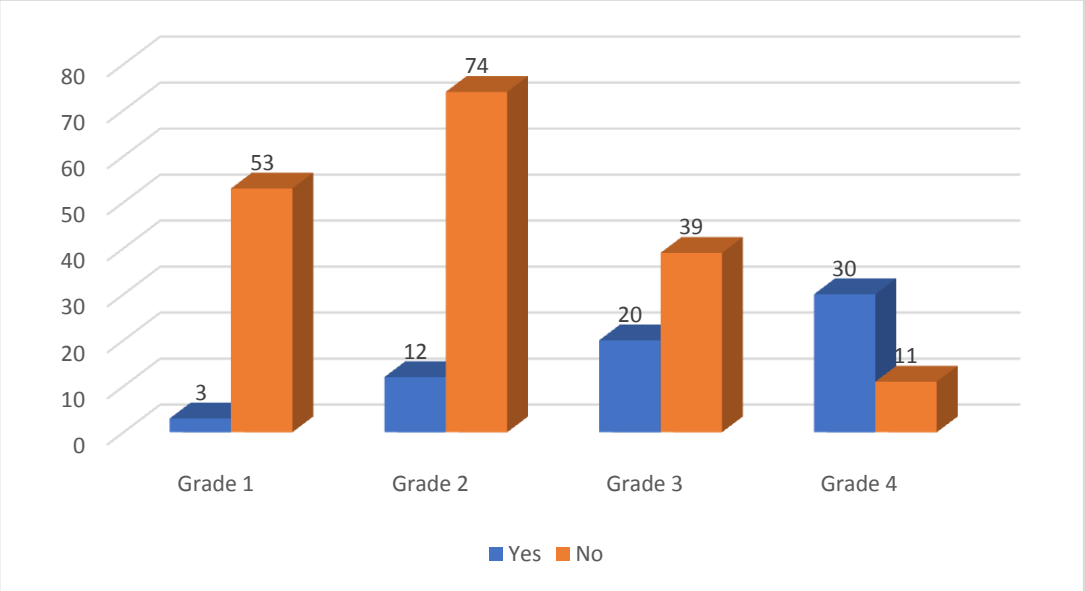

Figure 8: GB wall thickness and intra-operative score

CBD Dilatation >6mm.

In our study, 24 out of the 244 subjects had a positive finding for common bile duct dilatation. The data analysis revealed a **p-value of 0.339**, which is not statistically significant.

Table 14: CBD Dilatation and intra-operative score

CBD Dilatation (>6mm)	Grade 1	Grade 2	Grade 3	Grade 4	Total
Yes	4	6	9	5	24
No	52	80	50	38	220

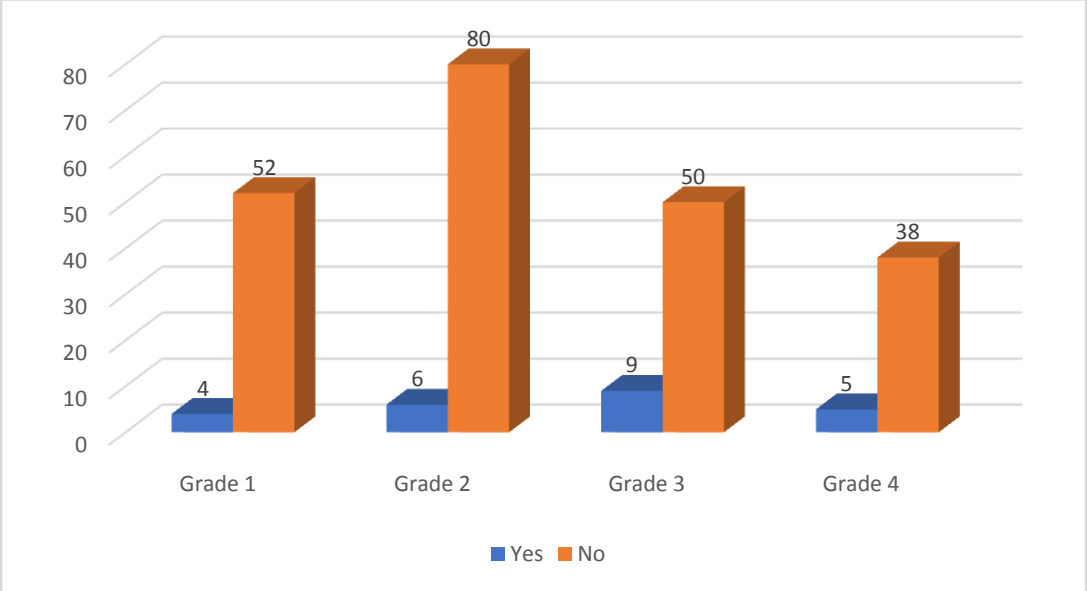

Figure 9: CBD Dilatation and intra-operative score

ERCP-

The study found that a history of prior ERCP (endoscopic retrograde cholangiopancreatography) was positive in 19 patients out of the total 244 enrolled. The statistical analysis revealed a **p-value of 0.593** for this factor, which is not considered statistically significant.

Table 15: ERCP and intra-operative score

ERCP	Grade 1	Grade 2	Grade 3	Grade 4	Total
Yes	4	5	7	3	19
No	52	81	52	40	220

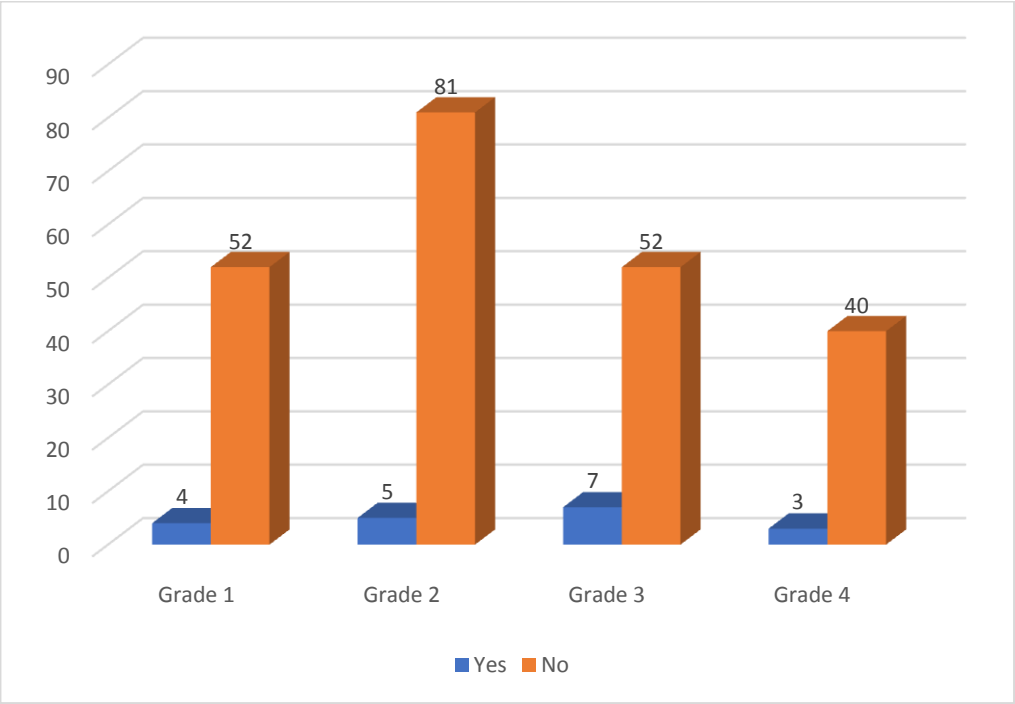

Figure 10: ERCP and intra-operative score

Table 16: **Incidence of Each Pre-operative risk score in this study**

Pre-Operative Risk score		
Score	Number	Percent
0	17	7.0
1	26	10.7
2	38	15.6
3	36	14.8
4	26	10.7
5	20	8.2
6	23	9.4
7	9	3.7
8	14	5.7
9	15	6.1
10	7	2.9
11	8	3.3
12	5	2.0
Total	244	100.0

Pre-operative score-

Pre-operative scoring system suggested by Nassar et al [39] was used.

The score in our study ranged from 0 to 12, mean score was 4.426, median was 4 and mode was 2.

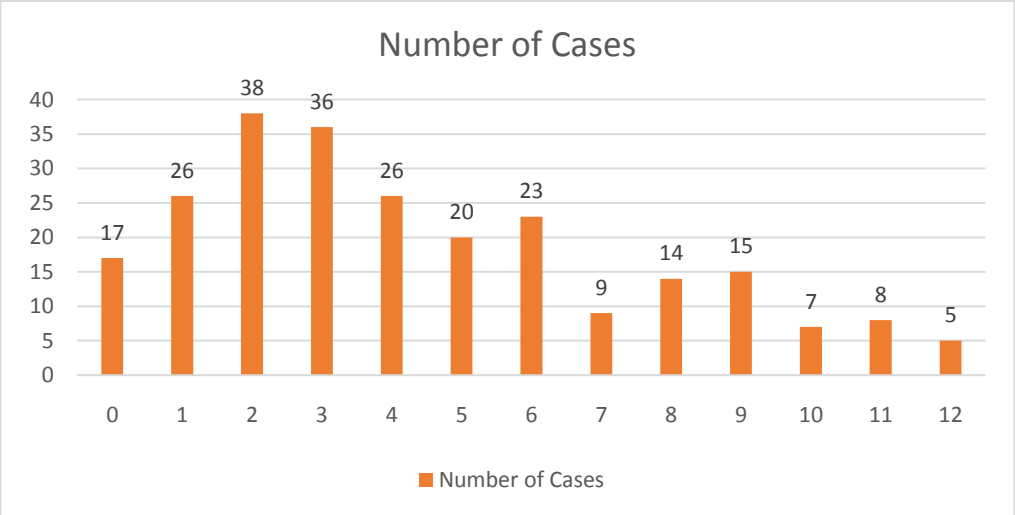

Figure 11: Incidence of Each Pre-operative risk score in this study

Table 17: Relationship of Pre-Operative Risk score and intra-operative score

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total
		Number	%age	Number	%age	Number	%age	Number	%age	
Risk Scale Group	Low risk	35	62.5%	6	7.0%	2	3.4%	0	0.0%	43
	Intermediate risk	20	35.7%	79	91.9%	41	69.5%	3	7.0%	143
	High risk	1	1.8%	1	1.2%	16	27.1%	40	93.0%	58
Total		56	100%	86	100%	59	100%	43	100%	244

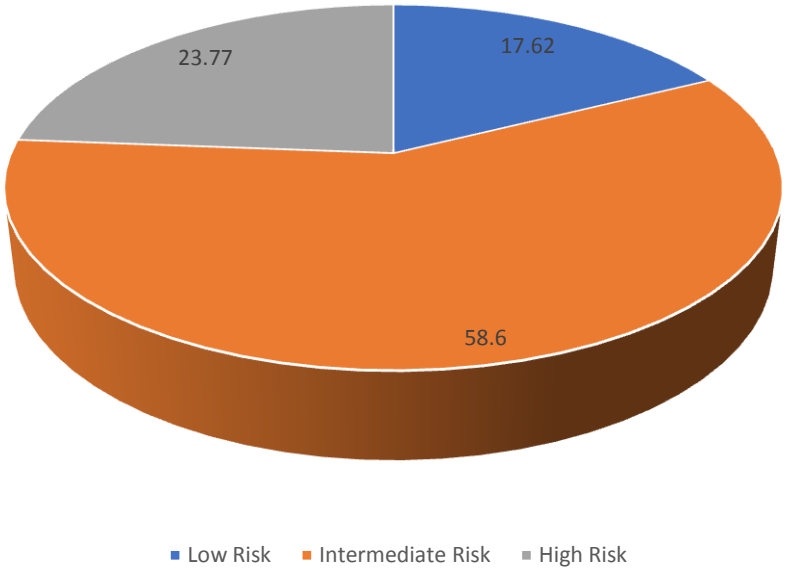

Figure 12: Percentage of Cases according to the Pre-Operative Score

The data revealed that the Intermediate-Risk group had the highest number of cases at 143, followed by High-Risk group with 58 cases and Low-Risk group with 43 patients. Low-Risk group had the maximum number of cases in Grade 1, with 35 cases, followed by 6 in Grade 2 and 2 cases in Grade 3, with no cases observed in Grade 4. The Intermediate-Group had the highest number of cases in Group 2 at 79, followed by 41 cases in Group 3, 20 cases in Group 1, and only 3 cases in Group 4. The High-Risk Group had the most cases in Grade 4 at 40, followed by 16 cases in Grade 3, and only 1 case each in Grade 1 and Grade 2.

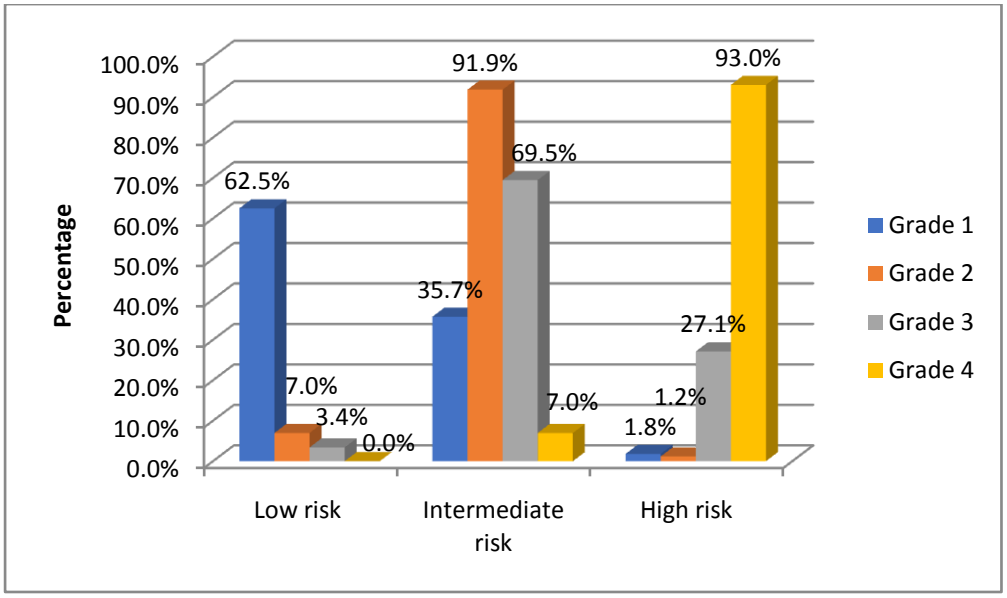

Figure 13: Intra-operative findings and their Pre-Operative Risk scores

The data analysis demonstrated a strong positive correlation between the preoperative score and the observed surgical difficulty during the laparoscopic cholecystectomy procedures. Specifically**, a p-value of less than 0.001**,which was statistically significant.

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Other Factors-

The medical history of all patients was thoroughly evaluated, including underlying co-morbidities such as T2DM, HTN, CAD, Polycystic Ovarian Disease, Obstructive Sleep Apnea, Thyroid disease, and Tuberculosis. Additionally, we gathered information on any previous abdominal surgeries the patients had undergone, as such prior procedures could also contribute to increased technical challenges during the gallbladder removal surgery.

Table 18: Relationship of various co-morbidities with intra-operative score

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
Diabetes Mellitus	No	54	96.4%	72	83.7%	45	76.3%	31	72.1%	202	12.574	0.006
	Yes	2	3.6%	14	16.3%	14	23.7%	12	27.9%	42		
Hypertension	No	54	96.4%	68	79.1%	47	79.7%	31	72.1%	200	11.460	0.009
	Yes	2	3.6%	18	20.9%	12	20.3%	12	27.9%	44		
CAD	No	56	100.0%	83	96.5%	58	98.3%	39	90.7%	236	7.297	0.063
	Yes	0	0.0%	3	3.5%	1	1.7%	4	9.3%	8		
PCOD	No	56	100.0%	85	98.8%	59	100.0%	43	100.0%	243	6.530	0.366
	Yes	0	0.0%	1	1.2%	0	0.0%	0	0.0%	1		
OSA	No	56	100.0%	86	100.0%	59	100.0%	43	100.0%	244	-	-
Thyroid Disease	No	54	96.4%	78	90.7%	58	98.3%	42	97.7%	232	5.681	0.128
	Yes	2	3.6%	8	9.3%	1	1.7%	1	2.3%	12		
TB	No	55	98.2%	85	98.8%	59	100.0%	43	100.0%	242	1.610	0.657
	Yes	1	1.8%	1	1.2%	0	0.0%	0	0.0%	2		
History of Previous Abdominal Surgery	No	44	78.6%	60	69.8%	42	71.2%	26	60.5%	172	3.871	0.276
	Yes	12	21.4%	26	30.2%	17	28.8%	17	39.5%	72		

Diabetes Mellitus was reported in 42 patients, with 14 patients each from Grades 2 and 3, 12 from Grade 4, and only 2 from Grade 1. Hypertension was present in 44 patients, with 18 patients from Grade 2, 12 each from Grades 3 and 4, and 2 from Grade 1. CAD was observed in 8 patients, with 4 from Grade 4, 1 from Grade 3, 3 from Grade 2, and none from Grade 1. One case of PCOD was noted in a Grade 2 patient. No cases of Obstructive Sleep Apnea were recorded. Thyroid Disease was present in 12 patients, with 8 cases from Grade 2, 1 each from Grades 3 and 4, and 2 from Grade 1. Two patients had a positive history of Tuberculosis, with 1 each from Grades 1 and 2. 72 patients reported previous abdominal surgery, with 12 cases in Grade 1, 26 in Grade 2, 17 in Grade 3, and 17 in Grade 4.

Diabetes Mellitus and Hypertension were found to be statistically significant predictors of the difficulty level encountered during the laparoscopic cholecystectomy procedures. Specifically, we found **a p-value of 0.006 in patients with Diabetes Mellitus**, indicating a strong correlation between the presence of this condition and an increased level of surgical complexity. Similarly, patients with **Hypertension had a p-value of 0.009**, confirming that this comorbidity was also a reliable predictor of greater technical challenges during the gallbladder removal surgery.

The presence of other comorbidities, such as CAD, PCOD, OSA, Thyroid disease, and Tuberculosis, was not found to be a significant predictor of surgical difficulty. Similarly, no co-relation was found between prior abdominal surgeries and the complexity of laparoscopic cholecystectomy procedure.

Lab Values-

The normal lab values were taken as provided by the DMCH pathology and Biochemistry Department, and all the values were noted in a standard format with appropriate units of measurement.

CBC-

The data showed that 134 patients had low complete blood count levels, while 110 patients exhibited normal Hemogram values. Additionally, 200 patients had normal platelet levels, 32 had low platelet counts, and 12 had high platelet levels. Among the total patient population, 186 individuals had normal TLC values, 4 had low TLC, and 54 had high TLC measurements.

The analysis of the CBC, including the Hemogram, Platelets, and TLC, with **p-values of 0.489, 0.638, and 0.168** respectively, showed that they had no relationship in helping to predict difficult laparoscopic cholecystectomy.

Table 19: Relationship of CBC and intra-operative score

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
CBC:Hmg (gm/dl)	Low (<12.0)	29	51.8%	47	54.7%	30	50.8%	28	65.1%	134	2.426	0.489
	Normal (12.0-17.0)	27	48.2%	39	45.3%	29	49.2%	15	34.9%	110		
CBC:Platelets (10^3/ul)	Low (<150)	5	8.9%	16	18.6%	5	8.5%	6	14.0%	32	4.288	0.638
	Normal (150-450)	48	85.7%	66	76.7%	51	86.4%	35	81.4%	200		
	High (>450)	3	5.4%	4	4.7%	3	5.1%	2	4.7%	12		
CBC:TLC (10^3/ul)	Low (<4.0)	1	1.8%	2	2.3%	0	0.0%	1	2.3%	4	9.09	0.168
	Normal (4.0-10.0)	46	82.1%	70	81.4%	43	72.9%	27	62.8%	186		
	High (>10.0)	9	16.1%	14	16.3%	16	27.1%	15	34.9%	54		
Total		56	100%	86	100%	59	100%	43	100%	244		

RFTs-

Serum creatinine concentrations were within the reference range for 120 patients, with 105 exhibiting low values and 19 displaying high values. Additionally, Urea was normal for 231 patients, low in 3 patients, and high in 10 patients.

The RFTs (urea and creatinine) with **p-values of 0.198 and 0.893**, respectively did not demonstrate any relationship with the difficulty of the surgical procedure.

Table 20:Relationship of RFTs and intra-operative score

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
RFT:Serum Creatinine (mg/dl)	Low (<0.7)	27	48.2%	34	39.5%	26	44.1%	18	41.9%	105	2.274	0.893
	Normal (0.7-1.2)	26	46.4%	45	52.3%	29	49.2%	20	46.5%	120		
	High (>1.2)	3	5.4%	7	8.1%	4	6.8%	5	11.6%	19		
RFT: Urea(mg/dl)	Low (<10)	1	1.8%	1	1.2%	1	1.7%	0	0.0%	3	8.592	0.198
	Normal (10-50)	54	96.4%	82	95.3%	57	96.6%	38	88.4%	231		
	High (>50)	1	1.8%	3	3.5%	1	1.7%	5	11.6%	10		
Total		56	100.0%	86	100.0%	59	100.0%	43	100.0%	244		

LFTs-

The Bilirubin (Total) was normal (0.0-1.2mg/dl) in 211 cases, whereas it was high in 33 cases. Bilirubin (direct) was normal (0.0-0.3mg/dl) in 188 cases and in 56 cases it was high. SGOT levels were normal0.0-40.0U/L) in 192 patients and was high in 52 patients. SGPT levels were normal(0.0-41.0U/L)) in 177 patients and high in 67. ALP levels were normal(40-129U/L) for 181 patients. It was low in 4 patients and high in 59 patients. Serum Albumin was normal (3.5-5.0g/dl) in 201 patients, with 40 having low levels and 3 having high levels.

LFTs, including SGPT, SGOT, ALP, and S.albumin, also did not serve as reliable predictors of surgical difficulty, with **p-values of 0.294, 0.597, 0.062, and 0.147**, respectively.

Table 21: Relationship of LFTs and intra-operative score

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
Lft:Bilrubin Total(mg/dl)	Normal (0.01.2)	53	94.6%	74	86.0%	53	89.8%	31	72.1%	211	11.381	0.010
	High(>1.2)	3	5.4%	12	14.0%	6	10.2%	12	27.9%	33		
Lft:Bilrubin Direct(mg/dl)	Normal(0.0-0.3)	45	80.4%	69	80.2%	48	81.4%	26	60.5%	188	8.146	0.043
	High(>0.3)	11	19.6%	17	19.8%	11	18.6%	17	39.5%	56		
Lft:SG/OT(U/L)	Normal(0.0-40)	48	85.7%	68	79.1%	46	78.0%	30	69.8%	192	3.715	0.294
	High(>40)	8	14.3%	18	20.9%	13	22.0%	13	30.2%	52		
Lft:SG/PT(U/L)	Normal(0.0-41)	44	78.6%	63	73.3%	41	69.5%	29	67.4%	177	1.881	0.597
	High(>41)	12	21.4%	23	26.7%	18	30.5%	14	32.6%	67		
Lft:ALP(U/L)	Low(<40)	1	1.8%	1	1.2%	1	1.7%	1	2.3%	4	11.996	0.062
	Normal(40-129)	44	78.6%	67	77.9%	47	79.7%	23	53.5%	181		
	High(>129)	11	19.6%	18	20.9%	11	18.6%	19	44.2%	59		
Lft:Serum Albumin(g/dl)	Low(<3.5)	7	12.5%	13	15.1%	7	11.9%	13	30.2%	40	9.512	0.147
	Normal(3.5-5.0)	48	85.7%	73	84.9%	51	86.4%	29	67.4%	201		
	High(>5.0)	1	1.8%	0	0.0%	1	1.7%	1	2.3%	3		
Total		56	100.0%	86	100.0 %	59	100.0 %	43	100.0 %	244		

However, the study found that bilirubin levels, both total and direct, were the pre-operative laboratory values that showed a statistically significant correlation with the surgical difficulty, with **p-values of 0.010 and 0.043,** respectively.

PTI-

184 had normal (9.3-12.6sec) PTI value, with 3 having less and 57 having High Value.

The study suggests that an abnormal PTI value may serve as a reliable predictor of increased technical difficulty during the laparoscopic cholecystectomy procedure as the **p-value was 0.03** which was statistically significant.

Table 22: Relationship of PTI and intra-operative score

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
PTI (sec)	Low (<9.3)	0	0.0%	1	1.2%	2	3.4%	0	0.0%	3	13.997	0.030
	Normal (9.3-12.6)	49	87.5%	67	77.9%	42	71.2%	26	60.5%	184		
	High (>12.6)	7	12.5%	18	20.9%	15	25.4%	17	39.5%	57		
Total		56	100.0%	86	100.0%	59	100.0%	43	100.0%	244		

Serum Amylase and Lipase-

Table 23: Relationship of Amylase and intra-operative score

			Intra-Operative Scale				
			Grade 1	Grade 2	Grade 3	Grade 4	Total
Serum Amylase (U/L)	Low (<28)	Count	0	0	1	3	4
		%	0.0%	0.0%	25.0%	75.0%	100%
	Normal (28-100)	Count	5	11	6	8	30
		%	16.7%	36.7%	20.0%	26.7%	100%
	High (>100)	Count	1	5	4	1	11
		%	9.1%	45.5%	36.4%	9.1%	100%
Total		Count	6	16	11	12	45
		%	13.3%	35.6%	24.4%	26.7%	100%

Table 24: Relationship of Lipase and intra-operative score

			Intra-Operative Scale				
			Grade 1	Grade 2	Grade 3	Grade 4	Total
Serum Lipase (U/L)	Low (<13)	Count	0	0	0	1	1
		%	0.0%	0.0%	0.0%	100.0%	100%
	Normal (13-60)	Count	5	11	7	7	30
		%	16.7%	36.7%	23.3%	23.3%	100%
	High (>60)	Count	1	5	4	4	14
		%	7.1%	35.7%	28.6%	28.6%	100%
Total		Count	6	16	11	12	45
		%	13.3%	35.6%	24.4%	26.7%	100%

There was a total of 45 patients with available Serum Amylase and Serum Lipase levels. 30 patients had normal (28-100U/L) serum amylase levels, with 4 having low value and 11 having high value. For Serum Lipase too, 30 patients had normal(13-60U/L) value with 1 patient having low and 14 patients having high value

The analysis revealed that neither serum amylase nor serum lipase levels showed a statistically significant correlation with the surgical difficulty encountered during the laparoscopic cholecystectomy, with p-values of 0.215 and 0.721, respectively. Serum amylase and lipase concentrations were not reliable predictors of increased technical challenges during the gallbladder removal surgery.

Hba1c-

Glycosylated Haemoglobin levels were evaluated for the Type 2 diabetic patients enrolled. Among the 40 patients, 2 patients had less than 6.5. where as 38 had a value more than 6.5. The analysis found that the p-value for HbA1c levels was 0.093, which was not statistically significant.

Table 25: Relationship of HbA1c and intra-operative score

	Intra-Operative Scale	Grade 1		Grade 2		Grade 3		Grade 4		Total	Chi-square value	p-value
		Number	%age	Number	%age	Number	%age	Number	%age			
HbA1c	< 6.5	1	33.3%	1	7.1%	0	0.0%	0	0.0%	2	6.416	0.093
	> 6.5	2	66.7%	13	92.9%	10	100.0%	13	100.0%	38		
Total		3	100.0%	14	100.0%	10	100.0%	13	100.0%	40		

DISCUSSION

This study was done in the Department of surgery in DMCH Ludhiana in 244 patients who were listed for laparoscopic Cholecystectomy over a period of one year between September 2022 and September 2023.
The data collected was evaluated and the following analysis was made.

Age-

Average age was 47.99 years, median of 48 years and a mode of 38 years. We were able to validate that the older age was a statistically significant factor in predicting difficult LC with a p-value of 0.001.
There were 80 patients below the age of 40 and 164 were more than age of 40. [40]
Various other studies like by Gupta et al, Jain et al and Mikwar et al have also validated [12,42,43]this.
We also found that as the age of the patient increases their chances of having increased Intra-operative difficulty also increases.

Gender-

Our study population consisted of 164 females (67.2%) and 80 males (32.8%). The analysis found that the p-value for gender was 0.53.Liu et al[28]and Jain et al[42] have also found no correlation between gender and surgical difficulty. In contrast Vivek et al [12], and Nassar et al [40]found males had an increased risk of complicated laparoscopic cholecystectomy.
The data suggests that the surgical complexity and technical challenges encountered during the laparoscopic cholecystectomy were not meaningfully impacted by whether the patient was male or female.
Although Harini R et al[44] showed gender to be a significant risk factor in conversion to open surgery, this particular patient cohort did not demonstrate any significant disparities in the overall difficulty of the procedure based on the patient's sex.

While, other patient-specific factors, such as age, underlying medical conditions, may play a more influential role in determining the complexity of laparoscopic gallbladder removal surgery, the potential influence of gender should not be dismissed. Previous studies have reported gender-based differences.

The lack of any association between gender and intraoperative difficulty in our analysis may be due to the specific patient population or due to it being done at a single Tertiary care centre, rather than a true absence of gender-based differences.

Surgeons should endeavour to comprehensively evaluate the patient's overall health, anatomical characteristics, and gender-related factors to anticipate and mitigate potential challenges associated with the surgical procedure. The possible influence of gender on surgical outcomes should not be disregarded,

ASA score-

The ASA score, which reflects the patient's preoperative health status, was analysed to evaluate its potential impact on the technical difficulty of LC. ASA score is a commonly used tool that evaluates the patient's overall health and fitness for surgery.

We found that higher ASA scores had a significantly greater risk of undergoing more complex LC as compared those with lower ASA scores. This observation aligns with Nassar et al [40] and Rosen et al [45], who have identified higher ASA scores as a significant predictor of increased surgical complexity and higher frequency of conversion.

Primary Diagnosis-

The analysis found that the primary diagnosis was a statistically significant predictor of surgical difficulty, as the p-value was 0.001. We found that patients with Cholecystitis were more likely to undergo a difficult LC, in comparison to the patients of Choledocholithiasis or Pancreatitis. This suggests that the underlying pathology and associated inflammation or anatomical changes in patients with

Cholecystitis may contribute to a more technically challenging surgical course during the laparoscopic removal of the gallbladder.

In contrast, patients with Choledocholithiasis or Pancreatitis may have a relatively less complex laparoscopic cholecystectomy procedure.

These findings of cholecystitis are consistent with those reported by Nassar et al [40], which have also identified acute cholecystitis as a major predictor of difficult laparoscopic cholecystectomy. Increased inflammatory changes, adhesions, and anatomical distortion associated with acute cholecystitis can make the surgical dissection and isolation of cystic artery and duct more challenging, ultimately leading to a more complex and demanding procedure.

Randhawa at al[11] and Nassar et al [40] have reported an increased difficulty in operating in patients with a primary diagnosis of Choledocholithiasis. This is likely due to variations in the patient population and management approach in these studies. These variations in our study go hand in hand with the CBD>6mm and ERCP not being significant risk factor in our cohort.

The type of admission-

Type of admission is a statistically significant predictor of difficulty in laparoscopic cholecystectomy, with a p-value of 0.001. Patients admitted in Emergency had more chances of undergoing complicated LC in comparison with those admitted through outpatient's department.

Patients with acute biliary pathology are more likely to require emergency admission and subsequently undergo a more complex laparoscopic cholecystectomy.

The acute inflammatory changes and anatomical distortion associated with emergency admissions can contribute to increased technical challenges during the surgical procedure. Asfaq at al [46] found similar results.

GB wall thickness-

The data analysis revealed a p-value of less than 0.01, indicating a strong correlation between the presence of a thick-walled gallbladder

and the likelihood of encountering a difficult LC. This finding suggests that the GB wall thickness is an important pre-operative factor in anticipating the level of surgical complexity and guide the surgical team's approach accordingly. A thickened GB wall will result in difficulty in grabbing the gall bladder for retraction and also hamper the manoeuvrability resulting in a difficult surgery. GB wall thickness was identified as one of the significant predictors of difficulty in laparoscopic cholecystectomy in several previous studies, including those by Nassar et al[40], Randhawa et al[11], Gupta at al [12]and Suyal at al [9].

CBD Dilatation-

The data analysis revealed a p-value of 0.339, which is not statistically significant. This is in contrast to Nassar at al [40] where CBD > 6mm was a significant factor.

Our data suggests that the size of the CBD may not be as reliable or predictive a factor for determining the complexity of the laparoscopic procedure, compared to other preoperative parameters such as gallbladder wall thickness.

This does not necessarily mean that CBD dilatation is an irrelevant factor. It is possible that a larger sample size or different patient population may reveal a stronger correlation between CBD dilatation and increased surgical difficulty. Additionally, the impact of CBD dilatation may depend on the underlying cause and the specific clinical context, rather than the size of the duct alone.

Also, it goes with the fact that neither ERCP nor choledocholithiasis was a significant predictor in our study.

ERCP-

The statistical analysis found a p-value of 0.593 for this factor, which is not considered statistically significant.

The invasive nature of ERCP and its potential to cause inflammation or scarring within the biliary anatomy could still contribute to increased technical challenges during the gallbladder removal procedure. While our study did not demonstrate a statistically significant correlation, it is

possible that in a larger or different patient population, a history of prior ERCP may prove to be a more meaningful indicator of intraoperative difficulty for the laparoscopic cholecystectomy. This is in contrast to Nassar at al [40] and Reinders at al [47]. However, Amin A, Haider M, Aamir I S, et al [48]. and Warchałowski et al[49]also reached the same conclusion as us.

DMCH being a tertiary care centre with senior surgeons who are able to tackle such complex cases effectively might be the reason for our result. Also, the trend of doing early laparoscopic cholecystectomy post ERCP instead of a delayed cholecystectomy (which may give time for scarring and fibrosis to develop) may have played a role in ERCP not being a significant factor.

Pre-operative score-

The study was aimed at finding the performance of the pre-operative score given by Nassar et al. [40]

The p value was less than 0.001 validating the utility and accuracy of this preoperative scoring system in reliably predicting the anticipated level of complexity associated with the gallbladder removal surgery for a given patient. This finding underscores the value of this comprehensive scoring approach in helping the surgical team anticipate potential technical challenges and plan the operative approach accordingly

Other Factors-

Diabetes mellitus-

The study found that 42 out of 244 patients had diabetes. The analysis showed a statistically significant p-value of 0.006. This suggests a strong link between diabetes and increased difficulty during the laparoscopic gallbladder removal procedure.

A, Haider M, Aamir I S, et al. [48], also reached the same conclusion. Additionally, Luthra et al. [50] found diabetic patients generally exhibited higher number of adverse intraoperative findings, such as a thickened

GB, pericholecystic adhesions, and a contracted GB, compared to non-diabetic individuals. Lio et al [51] in a metanalysis of 7 studies found Diabetes increases the chance of conversion to open cholecystectomy.
The increased surgical difficulty in diabetic patients likely stems from the effects of diabetes on tissue healing, inflammation, and vascular changes.

Hypertension-

The study found that 44 out of the 244 patients included had hypertension. The analysis of this data showed a statistically significant p-value of 0.009, suggesting that hypertension is also a contributing factor to increased surgical complexity during laparoscopic cholecystectomy. Warchałowskiet al. [49], also found that hypertensive patients experienced a more challenging and difficult surgical procedure, ultimately resulting in a higher rate of conversion to open laparotomy, compared to those without hypertension. Lio et al [51] in a metanalysis of 5 studies reached the same conclusion.
This might be due to the effect of hypertension on tissue perfusion, inflammation, and overall surgical complexity, which can make the gallbladder removal procedure more technically demanding for the surgical team.
Comorbidities, such as CAD, PCOD, OSA, Thyroid disease, and Tuberculosis, were of no statistical significance.

Previous abdominal surgeries-

No link between history of abdominal surgeries and the complexity or difficulty encountered during the laparoscopic cholecystectomy procedure was found. This contrasts with a previous meta-analysis conducted by Rothman et al [52]. However, the researchers in that meta-analysis determined that the quality of evidence for previous abdominal surgery as a risk factor to be very poor, primarily due to high degree of inconsistency in the data across the various studies included. Therefore, while prior abdominal procedures have been hypothesized to contribute to greater technical challenges during gallbladder

removal, the available evidence appears to be inconclusive regarding the strength of this particular risk factor.

Lab Values-

CBC- Hemogram, Platelets and TLC revealed no statistically significant relationship in helping to predict a difficult laparoscopic cholecystectomy, with p-values of 0.489, 0.638, and 0.168, respectively. This is in contrast to Buono,Romano et al [53]who found TLC as a significant factor, but in a metanalysis by Rothman et al[52] the evidence for it was not significant.

Similarly, **the RFTs,**(urea and creatinine) with p-values of 0.198 and 0.893respectively was not significant. Masri et al [54] showed that a Serum Creatinine value of <1.8 was of no significance. Alotaibi also [55] found no relation between kidney function Tests and Difficulty of Laparoscopic Cholecystectomy.

LFTs- including SGPT, SGOT, ALP, and S.albumin, also did not serve as reliable predictors of surgical difficulty, with p-values of 0.294, 0.597, 0.062, and 0.147, respectively. The same was seen by Buono Romano et al [53], they did not find SGPT, ALP as a significant factor. Though their Data showed SGOT being significant factor, but no further information was given. Bourgouin et al [56]did not find any correlation between SGOT/ SGPT and between surgical difficulty.

The study found that bilirubin levels, both total and direct, were the pre-operative laboratory values that showed a statistically significant correlation with the surgical difficulty, with p-values of 0.010 and 0.043, respectively.

Elevated bilirubin levels can be indicative of underlying hepatobiliary pathologies and may serve as a valuable predictor of increased technical complexity during the surgery. Similar findings were noted by Masri et al [54] and by Amin A, Haider M, Aamir I S, et al [48] Surgeons should closely examine a patient's bilirubin profile as part of the

preoperative evaluation and consider this factor when anticipating and planning for potential challenges during the laparoscopic cholecystectomy procedure.

The study also found that an abnormal **PTI (Prothrombin time Index)**value may serve as a reliable predictor of increased technical difficulty during the laparoscopic cholecystectomy procedure, as the p-value of 0.030 was statistically significant. Jang et al [57] and Bourgouin et al [56] reported similar results. The elevated prothrombin time index, which indicates impaired coagulation, can signal potential complications during the surgical removal of the gallbladder.

S.Amylase and S.Lipase-

The study also evaluated the potential impact of S.Amylase and S.Lipase levels on the difficulty of the laparoscopic cholecystectomy procedure. They are often elevated in conditions affecting the pancreas, such as pancreatitis.

The analysis of 45 patients revealed that neither S.Amylase and S.Lipasehas any correlation with the surgical difficulty encountered during the laparoscopic cholecystectomy, with p-values of 0.215 and 0.721, respectively. Alameldeen et al [58] found that surgery is safe in mild biliary pancreatitis. Falor Ae et al [59]found no difference in rate of complication between early or late cholecystectomy in mild biliary pancreatitis.

Hba1c levels-

With a p-value of 0.093 Glycosylated Haemoglobin showed no impact on technical difficulty of laparoscopic cholecystectomy in type 2 diabetic patients

The degree of glycaemic control, as reflected by HbA1c, was not a reliable predictor of the complexity encountered during the gallbladder removal surgery in this patient population. Bodmer et al[60], also found no relation between HbA1c and cholelithiasis. In contrast Luthra et al

found [50]Hba1c of >6 having more Intra-Operative Complications, although the conversion rate to open surgery was comparable.

SUMMARY AND CONCLUSION

Summary

This prospective observational study was conducted in the Surgery Department of DMCH from September 2022 to September 2023, involving 244 patients. The key findings are as follows:

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- **Age-**The data revealed that of the total patient cohort, 80 individuals were under 40 years of age, while 164 were over 40. Increasing patient age was identified as a reliable predictor of difficult laparoscopic cholecystectomy, with higher age associated with greater surgical complexity.

- **Gender-**The study population included 171 female and 73 male participants. The patients' gender was not determined to be a reliable or significant predictor of the difficulty level associated with performing the laparoscopic cholecystectomy procedures.

- **ASA score-**The data showed that 97 patients had an ASA score of 1, 98 had a score of 2, and 48 had a score of 3. There was only one patient with an ASA score of 4. Higher ASA scores are associated with greater complexity of laparoscopic cholecystectomy procedures.

- **Primary diagnosis-**The study findings demonstrated that among the 244 cases examined, the most prevalent primary diagnoses were Biliary Colic (n=137), Cholecystitis (n=68), Choledocholithiasis (n=14), and Pancreatitis (n=25). Notably, patients presenting with a primary diagnosis of Cholecystitis were more likely to experience a technically challenging laparoscopic cholecystectomy procedure.

- **Type of admission-**The data showed that 98 patients underwent elective admissions, 113 had delayed admissions, and 33 presented as emergency admissions. Significantly, emergency admission was

identified as a reliable predictor of increased technical complexity associated with performing laparoscopic cholecystectomy, in contrast to elective admission.

- **GB wall thickness-**Preoperative radiological examinations demonstrated that heightened GB wall thickness was detected in 67 cases, and this characteristic significantly correlated with technically challenging laparoscopic cholecystectomy procedures.

- **CBD dilatation-**The data showed that 24 patients had dilated CBD. However, preoperative CBD dilatation was not found to be a significant risk factor for technically challenging laparoscopic cholecystectomy procedures.

- **ERCP-**The data indicated that 19 patients had previously undergone endoscopic retrograde cholangiopancreatography procedures. However, the history of ERCP was not found to be a significant factor in predicting the technical complexity of laparoscopic cholecystectomy.

- **The preoperative scoring system** evaluated in this study demonstrated good accuracy in predicting the difficulty level of laparoscopic cholecystectomy procedures. The cohort included 43 patients in the low-risk group, 143 in the intermediate-risk group, and 58 in the high-risk group. This scoring system could help surgeons identify high-risk patients and plan their surgical approach accordingly.

- **Other Factors**:
  42 patients with Diabetes Mellitus were part of this study along with 44 Hypertensive patients. **Diabetes and Hypertension** were also associated with difficult laparoscopic cholecystectomies.

- Lab values such as **elevated Bilirubin and PTI** can also serve as indicators of the difficulty level associated with laparoscopic cholecystectomy procedures. These elevated levels may suggest the presence of underlying biliary pathology, which can subsequently increase the complexity of the surgical intervention.

  Further prospective multicenter studies are needed to identify factors that can help in predicting difficulty of laparoscopic cholecystectomy.

Conclusion

The findings of this study indicated that several patient-specific factors were associated with an increased risk of complicated laparoscopic cholecystectomy. These included advanced patient age, elevated ASA scores, the presence of cholecystitis, emergency admission status, thick gallbladder wall, and comorbidities such as diabetes mellitus and hypertension. Additionally, abnormal blood bilirubin and PTI levels were also correlated with increased procedural complexity.

In contrast, factors such as gender, common bile duct dilation, and prior ERCP procedures were not significantly associated with procedural difficulty.

The preoperative scoring system utilized in this investigation was also validated as an effective tool for assessing patient risk prior to surgery. This allows for accurate forecasting of the likelihood of a challenging operation. Consequently, this can facilitate patient selection, optimize surgical planning, and informed consent. Surgeons can use the system to determine if a specialist is required for high difficulty cases, enabling complex operations to be scheduled appropriately. Furthermore, the score could be applied to optimize training for surgical trainees and risk-adjusted outcomes in future research.

Further prospective multicenter studies are needed to further confirm the findings and to identify other factors that can help in predicting difficulty of laparoscopic cholecystectomy.

BIBLIOGRAPHY

[1] Beckingham IJ. ABC of diseases of liver, pancreas, and biliary system. Gallstone disease. BMJ. 2001;322:91-94.

[2] Johnson CD. ABC of the upper gastrointestinal tract. Upper abdominal pain: Gall bladder. BMJ. 2001;323:1170-3.

[3] Duncan CB, Riall TS. Evidence-based current surgical practice: calculous gallbladder disease. J Gastrointest Surg. 2012;16:2011-25.

[4]Gutt C, Schläfer S, Lammert F. The Treatment of Gallstone Disease. DtschArztebl Int. 2020;117:148-158.

[5] Strasberg SM, Clavien PA. Overview of therapeutic modalities for the treatment of gallstone diseases. Am J Surg. 1993;165:420-6.

[6] Anmol N, Lakshminarayan G, Manohar TM, Avadhani GK, Hazarika A. Outcome following open and laparoscopic cholecystectomy. Journal of Evolution of Medical and Dental Sciences. 2014;3:4061-72.

[7] Lam CM, Murray FE, Cuschieri A. Increased cholecystectomy rate after the introduction of laparoscopic cholecystectomy in Scotland. Gut. 1996;38:282-4.

[8] Ahmad ME. Incidence of the Complications of Factors Predisposing to, and the rate of Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy".2017;28660-63.

[9] Suyal K, Bugalia RP, Mandia R. Evaluation the efficacy of scoring method for pre-operative prediction of difficult laparoscopic cholecystectomy. International Journal of Surgery. 2020;4:61-8.

[10] Nidoni R, Udachan TV, Sasnur P, Baloorkar R, Sindgikar V, Narasangi B. Predicting difficult laparoscopic cholecystectomy based on clinicoradiological assessment. Journal of clinical and diagnostic research: JCDR. 2015;9(12):9.

[11] Randhawa JS, Pujahari AK. Preoperative prediction of difficult lap chole: a scoring method. Indian Journal of Surgery. 2009;71:198-201.

[12] Gupta N, Ranjan G, Arora MP, Goswami B, Chaudhary P, Kapur A, et al. Validation of a scoring system to predict difficult laparoscopic cholecystectomy. International Journal of Surgery. 2013;11:1002-6.

[13] Saber A, Abu-Elela ST, Shaalan KM, Al-Masry AR. Preoperative prediction of the difficulty of laparoscopic cholecystectomy. J Surg Surgical Res. 2015;1:15-8.

[14] سودحـ یر , راج. Preoperative grading system versus intraoperative grading system as predictors for difficult laparoscopic cholecystectomy: A comparative validation study. Journal of Clinical and Basic Research. 2018;2:39-47.

[15] Parmar H, Chauhan S, Arun R, Sutaria A. Pre-operative prediction of difficult laparoscopic cholecystectomy from clinical, hematological and radiological parameters. International Surgery Journal. 2018;5:3807-13.

[16] Gadacz TR. US experience with laparoscopic cholecystectomy. The American journal of surgery. 1993 Apr 1;165(4):450-4.

[17] SakpalSV, BindraSS, Chamberlain RS. Laparoscopiccholecystectomy conversion rates two decades later. JSLS: Journal of the Society of Laparoendoscopic Surgeons. 2010;14:476.

[18] Costa AD. Teaching gall bladder surgery: remembrance of things past, or defensive cholecystectomy revisited. Australian and New Zealand Journal of Surgery. 1999;69:834-6.

[19] Nassar AH, Ashkar KA, Mohamed AY, Hafiz AA. Is laparoscopic cholecystectomy possible without video technology?. Minimally Invasive Therapy. 1995;4:63-5.

[20] Stinton LM, Myers RP, Shaffer EA. Epidemiology of gallstones. Gastroenterology Clinics. 2010;39:157-69.

[21] Shaffer EA. Epidemiology of gallbladder stone disease. Best practice & research Clinical gastroenterology. 2006;20:981-96.

[22] Soltes M, Radoňak J. A risk score to predict the difficulty of elective laparoscopic cholecystectomy. Videosurgery and other miniinvasive techniques. 2014;9:608-12.

[23] Traverso LW. Carl Langenbuch and the first cholecystectomy. The American Journal of Surgery. 1976;132:81-2.

[24] Blum CA, Adams DB. Who did the first laparoscopic cholecystectomy?. Journal of minimal access surgery. 2011;7:165-8.

[25] Gollan JL, Bulkley GB, Diehl AM, Elashoff JD, Federle MP, Hogan WJ, Kelly KA, Massanari DL, Powell DW, Sorrell M, Wilson JA. Gallstones and laparoscopic cholecystectomy. Jama. 1993;269:1018-24.

[26] Soper NJ, Stockmann PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy the new'gold standard'?. Archives of surgery. 1992;127:917-23.

[27] Kum CK, Eypasch E, Lefering R, Paul A, Neugebauer E, Troidl H. Laparoscopic cholecystectomy for acute cholecystitis: is it really safe? World J Surg. 1996 Jan;20(1):43-8; discussion 48-9.

[28] Liu CL, Fan ST, Lai EC, Lo CM, Chu KM. Factors affecting conversion of laparoscopic cholecystectomy to open surgery. Archives of surgery. 1996;131:98-101.

[29] Liu CL, Fan ST, Lai EC, Lo CM, Chu KM. Factors affecting conversion of laparoscopic cholecystectomy to open surgery. Archives of surgery. 1996;131:98-101.

[30] Eldar S, Sabo E, Nash E, Abrahamson J, Matter I. Laparoscopic cholecystectomy for acute cholecystitis: prospective trial. World journal of surgery. 1997;21:540-5.

[31] Kama NA, Doganay M, Dolapci M, Reis E, Atli M, Kologlu M. Risk factors resulting in conversion of laparoscopic cholecystectomy to open surgery. Surgical endoscopy. 2001;15:965-8.

[32] Gouma DJ. Conversion from laparoscopic to open cholecystectomy. Journal of British Surgery. 2006;93:905-6.

[33] Lujan JA, Parrilla P, Robles R, Marin P, Torralba JA, Garcia-Ayllon J. Laparoscopic cholecystectomy vs open cholecystectomy in the treatment of acute cholecystitis: a prospective study. Archives of surgery. 1998;133:173-5.

[34] Tang B, Cuschieri A. Conversions during laparoscopic cholecystectomy: risk factors and effects on patient outcome. Journal of gastrointestinal surgery. 2006;10:1081-91.

[35] Goonawardena J, Gunnarsson R, De Costa A. Predicting conversion from laparoscopic to open cholecystectomy presented as a probability nomogram based on preoperative patient risk factors. The American Journal of Surgery. 2015;210:492-500.

[36] Sippey M, Grzybowski M, Manwaring ML, Kasten KR, Chapman WH, Pofahl WE, et al. Acute cholecystitis: risk factors for conversion to an open procedure. Journal of surgical research. 2015;199:357-61.

[37] Griffiths EA, Hodson J, Vohra RS, Marriott P, Katbeh T, Zino S, et al. West Midlands Research Collaborative. Utilisation of an operative difficulty grading scale for laparoscopic cholecystectomy. Surgical endoscopy. 2019;33:110-21.

[38] Siddiqui MA, Rizvi SA, Sartaj S, Ahmad I, Rizvi SW. A standardized ultrasound scoring system for preoperative prediction of difficult laparoscopic cholecystectomy. Journal of medical ultrasound. 2017;25:227-31.

[39] Hu AS, Menon R, Gunnarsson R, De Costa A. Risk factors for conversion of laparoscopic cholecystectomy to open surgery–A systematic literature review of 30 studies. The American Journal of Surgery. 2017;21:920-30.

[40] Nassar AH, Hodson J, Ng HJ, Vohra RS, Katbeh T, Zino S, et al. Predicting the difficult laparoscopic cholecystectomy: development and validation of a pre-operative risk score using an objective operative difficulty grading system. Surgical endoscopy. 2020;34:4549-61.

[41] Goyal P, Muthuraman S, Sharma S. Simple and Reliable Scoring System to Predict Difficult Laparoscopic Cholecystectomy Preoperatively. World Journal of Laparoscopic Surgery with DVD. 2021;14:34-8.

[42] Karim ST, Chakravarti S, Jain A, Patel G, Dey S. Difficult laparoscopic cholecystectomy predictors and its significance: our experience. Journal of West African College of Surgeons. 2022;12:56-63.

[43] Mikwar Z, Aljadani FF, Alotaibi AK, Neazy FA, Alsaadi NH, Alzahrani MA, et al. The Conversion Rate of Laparoscopic Cholecystectomy to Open Cholecystectomy at King Abdulaziz Medical City, Jeddah, Saudi Arabia: Prevalence and Causes. Cureus. 2024;16.

[44] H. R, H. Prasath and A. Majeed, "To study the conversion rate of laparoscopic cholecystectomy to open cholecystectomy and its causes".

[45] Rosen M, Brody F, Ponsky J. Predictive factors for conversion of laparoscopic cholecystectomy. The American journal of surgery. 2002;184:254-8.

[46] Ashfaq A, Ahmadieh K, Shah AA, Chapital AB, Harold KL, Johnson DJ. The difficult gall bladder: Outcomes following laparoscopic cholecystectomy and the need for open conversion. The American journal of surgery. 2016;212:1261-4.

[47] Reinders JS, Gouma DJ, Heisterkamp J, Tromp E, van Ramshorst B, Boerma D. Laparoscopic cholecystectomy is more difficult after a previous endoscopic retrograde cholangiography. HPB (Oxford). 2013;15:230-4.

[48] Amin A, Haider MI, Aamir IS, Khan MS, Khalid Choudry U, Amir M, Sadiq A. Preoperative and Operative Risk Factors for Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy in Pakistan. Cureus. 2019;11:5446.

[49] Warchałowski Ł, Łuszczki E, Bartosiewicz A, Dereń K, Warchałowska M, Oleksy Ł, et al. The Analysis of Risk Factors in the Conversion from Laparoscopic to Open Cholecystectomy. Int J Environ Res Public Health. 2020;17:7571.

[50] Luthra A, Behura A, Behera CR, Mishra A, Mohanty S, Panda B. Intraoperative Findings of Elective Laparoscopic Cholecystectomy in Diabetics Versus Nondiabetics: A Comparative Study. Cureus. 2022;14:20886.

[51] Magnano San Lio R, Barchitta M, Maugeri A, Quartarone S, Basile G, Agodi A. Preoperative Risk Factors for Conversion from Laparoscopic to Open Cholecystectomy: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2022;20:408.

[52] Philip Rothman J, Burcharth J, Pommergaard HC, Viereck S, Rosenberg J. Preoperative Risk Factors for Conversion of Laparoscopic Cholecystectomy to Open Surgery - A Systematic Review and Meta-Analysis of Observational Studies. Dig Surg. 2016;33:414-23.

[53] Di Buono G, Romano G, Galia M, Amato G, Maienza E, Vernuccio F, Bonventre G, Gulotta L, Buscemi S, Agrusa A. Difficult laparoscopic cholecystectomy and preoperative predictive factors. Sci Rep. 2021;11:2559.

[54] Al Masri S, Shaib Y, Edelbi M, Tamim H, Jamali F, Batley N, et al. Predicting conversion from laparoscopic to open cholecystectomy: a single institution retrospective study. World journal of surgery. 2018;42:2373-82.

[56] Bourgouin S, Mancini J, Monchal T, Calvary R, Bordes J, Balandraud P. How to predict difficult laparoscopic cholecystectomy? Proposal for a simple preoperative scoring system. The American journal of surgery. 2016;212:873-81.

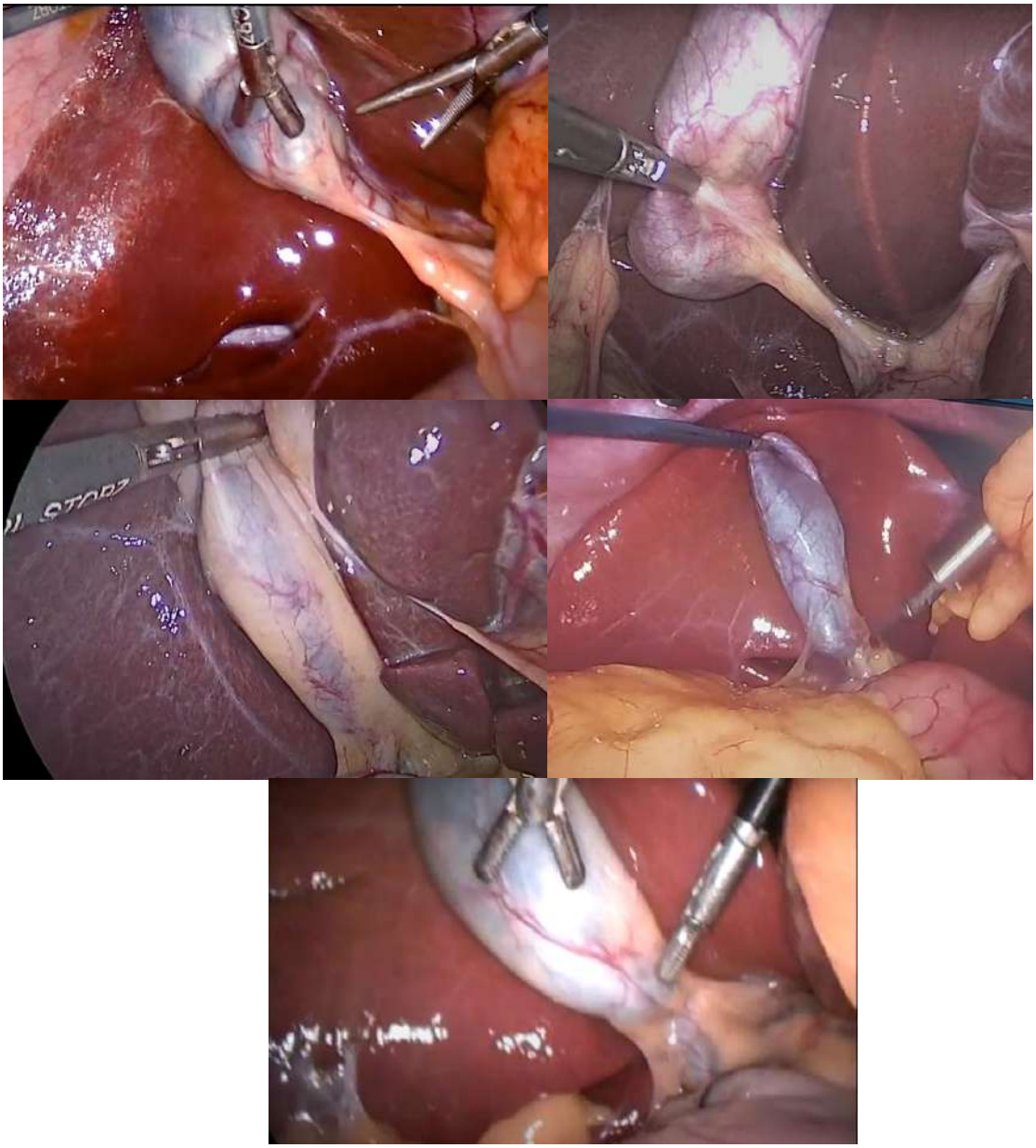
[57] Jang YR, Ahn SJ, Choi SJ, Lee KH, Park YH, Kim KK, et al;. Acute cholecystitis: predictive clinico-radiological assessment for conversion of laparoscopic cholecystectomy. Acta Radiologica.2020;61:1452-62.

[58] Abouelnagah GM, Alameldeen ML, Ammar MO, Rageh TM. Laparoscopic cholecystectomy role in the management of acute biliary pancreatitis. Menoufia Medical Journal. 2018;31:145-51.

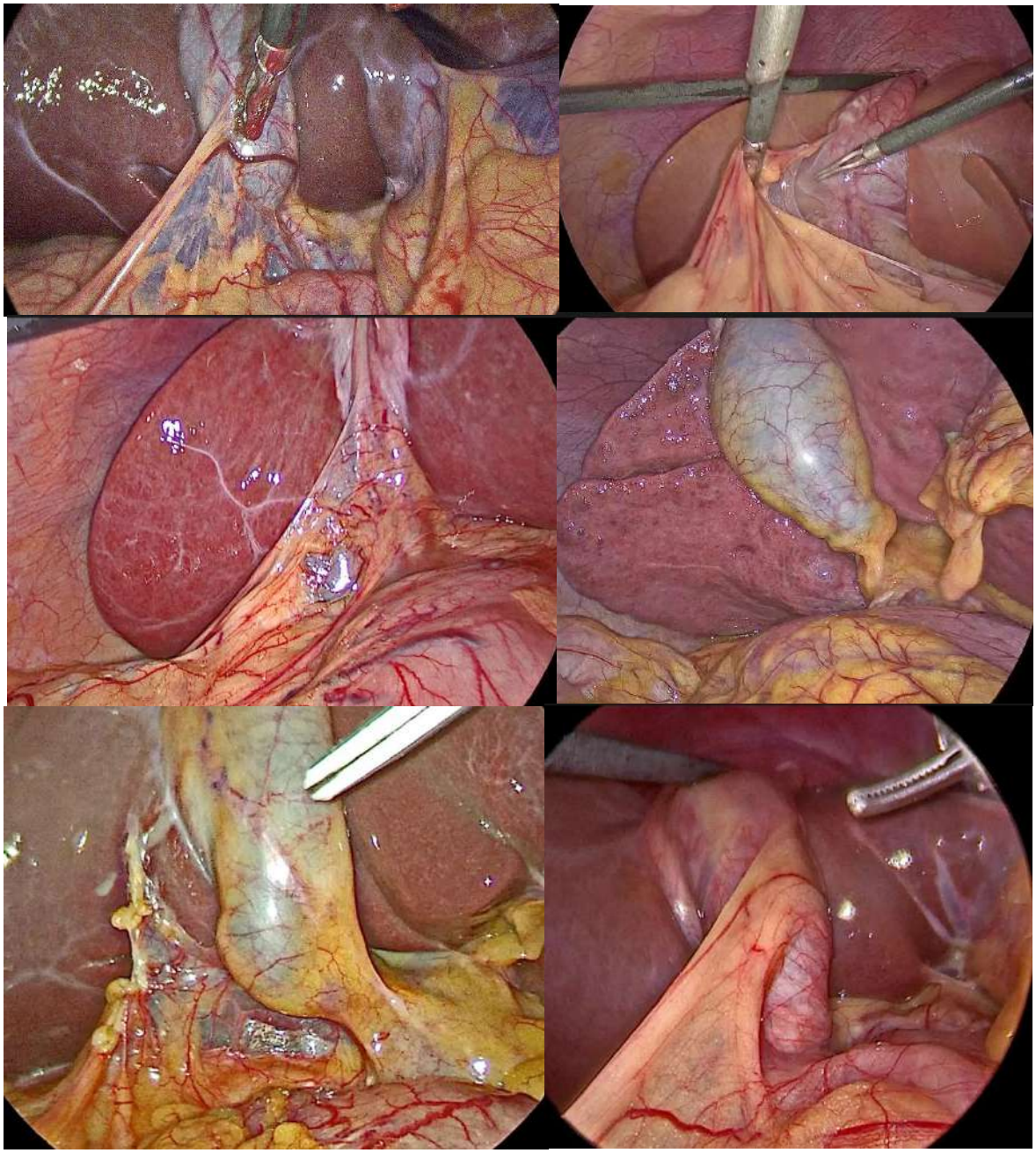
[59] Falor AE, de Virgilio C, Stabile BE, Kaji AH, Caton A, Kokubun BA, et al. Early laparoscopic cholecystectomy for mild gallstone pancreatitis: time for a paradigm shift. Archives of surgery. 2012;147:1031-5.

[60] Bodmer M, Brauchli YB, Jick SS, Meier CR. Diabetes mellitus and the risk of cholecystectomy. Digestive and liver disease. 2011;43:742-7.

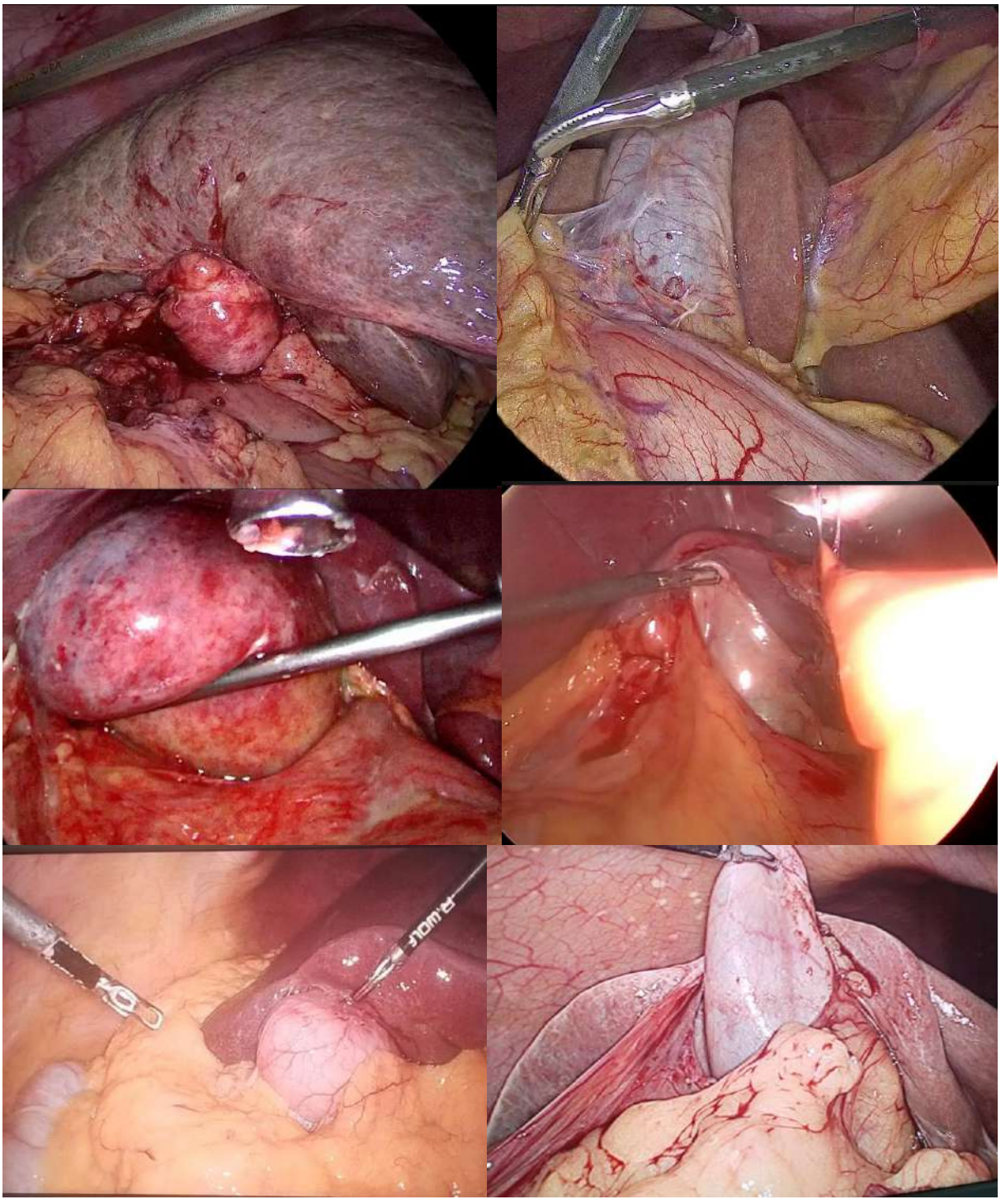
Intra operative Score (Nassar Classification) Grade 1



Intra operative Score (Nassar Classification) Grade 2



Intra operative Score (Nassar Classification) Grade 3



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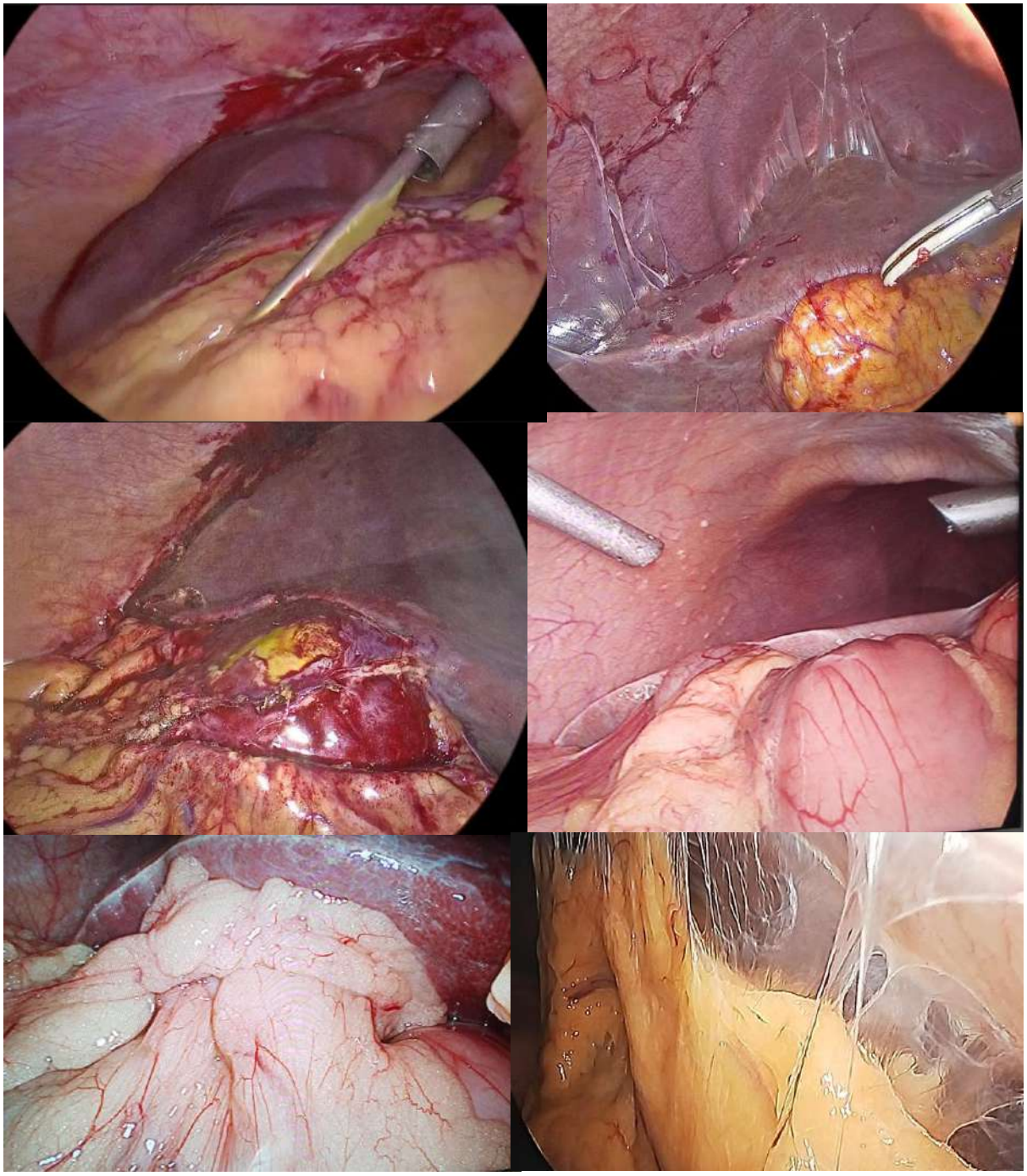

S. No.	Name	Age	Sex	MRD Number	Diabetes Mellitus	Hypertension	CAD	PCOD	OSA	Thyroid Disease	TB	History of Previous Adbdominal Surgery	Primary Diagnosis	Thick Walled Gallbladder (>3 mm)	CBD Dilalation (> 6mm)	ERCP	Type of Admission	ASA Score	Pre-Operative Risk Scale	Risk Scale gp
1	SS	34	Male	1394575	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
2	A	36	Female	550351	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
3	PK	63	Female	178797	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	2	3	2
4	SK	53	Male	4828	Yes	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	3	2
5	SKS	54	Male	1278064	Yes	Yes	No	No	No	No	No	Yes	Pancreatitis	Yes	No	No	Delayed	3	7	3
6	SK	42	Male	1384775	Yes	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	4	2
7	KK	62	Female	1385098	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	Yes	Yes	Delayed	1	10	3
8	AS	64	Male	1383716	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	3	2
9	AM	46	Female	1333270	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	1	2	2
10	VJ	53	Female	1377458	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Delayed	1	8	3
11	JG	47	Male	1377354	No	No	No	No	No	No	No	No	Choledocolithiasis	Yes	Yes	Yes	Delayed	1	8	3
12	JS	46	Male	676338	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	3	2
13	K	53	Female	4842	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	2	2
14	SB	38	Female	1376752	No	No	No	No	No	Yes	No	No	Biliary Colic	No	No	No	Delayed	2	2	2
15	MG	53	Female	1380663	No	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Emergency	2	4	2
16	SD	57	Female	1374924	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
17	AD	46	Female	1363475	No	No	No	No	No	No	No	No	Pancreatitis	No	Yes	Yes	Elective	2	4	2
18	HK	27	Female	453737	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
19	S	32	Female	1340862	No	No	No	No	No	No	No	No	Choledocolithiasis	No	Yes	Yes	Delayed	1	4	2
20	BS	48	Male	3486	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	2	2
21	GK	50	Female	1377607	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	1	1
22	AK	33	Female	1448361	No	No	No	No	No	Yes	No	Yes	Biliary Colic	No	No	No	Elective	3	2	2
23	S	32	Female	1445373	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
24	JK	53	Female	1442651	Yes	Yes	No	No	No	No	No	No	Cholecystitis	No	No	No	Elective	3	7	3
25	SS	38	Female	606659	No	No	No	No	No	Yes	No	Yes	Biliary Colic	No	No	No	Elective	2	1	1
26	AS	59	Male	1439334	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Emergency	2	5	2
27	P	33	Male	1450502	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
28	LD	73	Male	1446027	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Elective	2	3	2
29	HH	40	Male	1254663	No	No	No	No	No	No	No	No	Pancreatitis	Yes	No	No	Emergency	2	7	3
30	GR	57	Female	1452650	Yes	Yes	No		No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	2	9	3
31	TR	67	Male	1442846	No	Yes	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	3	5	2
32	RK	43	Female	1455242	No	No	No	No	No	No	No	Yes	Cholecystitis	No	No	No	Delayed	1	6	2
33	SJ	60	Female	1456728	No	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	3	3	2
34	AS	37	Female	1456601	No	No	No	No	No	No	No	Yes	Pancreatitis	No	No	No	Delayed	3	3	2
35	SS	54	Male	1456822	Yes	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	4	2
36	R	34	Female	1405304	No	No	No	No	No	No	No	Yes	Cholecystitis	No	No	No	Delayed	1	5	2
37	PS	71	Male	1188020	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	1	3	2
38	HK	72	Female	1461133	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Delayed	1	6	2
39	M	56	Female	757174	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Delayed	2	9	3
40	GK	50	Female	850633	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	3	10	3
41	RR	34	Female	1465477	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Delayed	2	8	3
42	GK	44	Female	551104	No	Yes	Yes	No	No	No	No	No	Cholecystitis	No	No	No	Delayed	3	8	3
43	SL	60	Male	1457848	Yes	Yes	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Emergency	3	12	3
44	NK	47	Female	1496129	Yes	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	3	4	2
45	AK	48	Female	1430548	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Delayed	2	9	3
46	RK	52	Male	1496252	Yes	Yes	Yes	No	No	No	No	No	Cholecystitis	Yes	No	No	Delayed	3	11	3
47	KL	38	Female	1496920	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	0	1
48	A	62	Female	1442579	No	No	No	No	No	No	No	No	Choledocolithiasis	No	Yes	Yes	Delayed	3	7	3
49	LS	58	Female	1490086	No	Yes	No	No	No	No	No	Yes	Pancreatitis	Yes	No	No	Emergency	3	7	3

S. No.	Intra-Operative Scale	CBC: Hmg	CBC: Platelets	CBC: TLC	Lft:Bilrubin Total	Lft:Bilrubin Direct	Lft:SG/OT	Lft:SG/PT	Lft:ALP	Lft:Serum Albumin	PTI	RFT:Serum Creatinine	RFT: Serum Urea	HbA1c	S. Amylase	S. Lipase	Converted to open
1	Grade 1	9.9	144	9.5	0.36	0.08	18	28	95	3.84	12.5	0.98	25				NO
2	Grade 1	11.2	166	5.4	0.19	0.1	23	17	45	4.12	11.7	0.51	18		44	27	NO
3	Grade 2	12.5	231	9.5	0.21	0.07	20	15	60	4.3	13.5	0.78	17		71	39	NO
4	Grade 2	14.5	212	8.1	0.91	0.38	32	37	95	4.05	11	0.72	28	8.1			NO
5	Grade 4	11.8	255	9.1	0.41	0.08	19	19	94	4.23	12.2	0.85	36	6.6	51	24	NO
6	Grade 2	13.4	144	8.3	0.36	0.06	40	28	78	3.98	11	0.71	29	7.3	42	14	NO
7	Grade 2	9.9	262	9.6	0.7	0.24	839	638	250	3.24	11	0.77	69				NO
8	Grade 3	12.8	190	7.13	0.34	0.08	23	18	84	4.16	10.9	0.8	26		113	44	NO
9	Grade 3	10.6	7.77	228	1.38	0.54	62	54	95	4.2	12.5	0.51	15		43	30	NO
10	Grade 4	13.9	321	7.87	0.35	0.13	18	19	79	4.34	13.1	1.1	21				NO
11	Grade 1	10.4	143	8.5	0.44	0.34	16	23	75	4.16	11.9	0.43	10		32	56	NO
12	Grade 2	13.2	157	5.99	0.56	0.18	56	83	96	4.09	11.3	0.6	18		75	40	NO
13	Grade 2	12.2	325	9.4	0.17	0.1	22	33	109	3.84	10.3	0.62	21		106	48	NO
14	Grade 1	12.4	200	9.6	0.4	0.05	25	36	114	4.25	11.1	0.63	30		95	56	NO
15	Grade 2	11.1	240	7.8	0.38	0.18	28	46	145	4.4	12.1	0.98	25				NO
16	Grade 1	9.8	210	8.4	0.7	0.35	19	26	78	3.82	11.2	0.46	34				NO
17	Grade 2	11.5	265	5.8	0.36	0.1	65	28	78	4.27	10.9	1.12	16				NO
18	Grade 1	13.5	190	6.8	0.7	0.23	46	45	125	4.28	12.5	0.64	36				NO
19	Grade 2	11	454	11.98	0.59	0.18	45	70	65	3.84	11.8	0.87	18				NO
20	Grade 2	9.8	478	7.54	0.38	0.07	20	62	130	3.58	10.8	1.3	11				NO
21	Grade 1	12	216	6.5	0.25	0.18	21	19	182	4.3	10.5	1.1	19				NO
22	Grade 2	11.1	148	7.19	0.4	0.1	18	11	69	4.16	13.4	0.55	18				NO
23	Grade 1	13.1	262	7.9	0.35	0.14	21	32	71	4.65	13.1	0.87	20				NO
24	Grade 4	12.5	188	11.99	0.31	0.12	20	18	32	4.5	12.1	0.6	21	9	55	121	NO
25	Grade 2	10.4	357	5.7	0.3	0.11	26	28	67	4.66	10.3	1.23	19				NO
26	Grade 2	12	282	9.4	1.05	0.66	30	124	123	4.04	12.2	1.8	18		491	339	NO
27	Grade 1	13.1	151	5.2	0.34	0.16	42	61	69	4.54	12.3	0.92	23				NO
28	Grade 2	12.9	215	6.9	0.55	0.23	24	40	99	4	12.5	1.09	28		97	144	NO
29	Grade 4	13.4	140	7.2	0.84	0.15	21	18	98	4.11	12.5	0.91	17		64	90	NO
30	Grade 4	8.9	517	10.2	0.41	0.08	13	13	93	4.08	12.6	0.8	36	10.5			NO
31	Grade 2	10.5	454	19.7	0.64	0.29	88	201	159	3.65	3.73	1.18	27				NO
32	Grade 2	11	243	13.95	0.87	0.23	18	21	93	4.8	12.7	0.57	10		64	27	NO
33	Grade 2	11.7	291	8.56	0.38	0.17	13	21	112	3.4	14	0.97	38				NO
34	Grade 2	12.2	344	6.22	2.16	1.24	82	69	235	4.15	12.1	0.79	22		34	52	NO
35	Grade 3	12.2	408	9.2	0.12	0.08	10	10	98	3.84	12.2	0.74	25				NO
36	Grade 3	9.8	295	7.9	0.7	0.2	30	84	131	4.4	12.45	0.6	21				NO
37	Grade 3	12.8	207	6.1	0.9	0.1	14	18	53	4.27	12	0.63	24				NO
38	Grade 3	11.5	306	9.2	0.87	0.07	31	34	98	4.1	11.6	1.08	33				NO
39	Grade 4	9.8	404	9.2	0.59	0.23	15	20	172	4.06	11.6	0.56	19		61	18	NO
40	Grade 4	9.8	131	4.4	0.88	0.19	32	24	152	4.2	11.5	0.65	23	7.2			NO
41	Grade 4	11.5	244	7.8	0.14	0.09	29	60	115	4.57	11.7	0.54	15		41	26	NO
42	Grade 4	11.1	243	9	0.94	0.18	40	38	191	1.66	14	0.55	24				NO
43	Grade 4	11.5	88	4.34	2.5	2.33	146	66	110	2.1	15.2	1.27	55	11.7	23	35	NO
44	Grade 2	11.2	132	7.12	0.49	0.24	26	26	95	4.18	11.2	0.6	36	10.5			NO
45	Grade 4	9.8	180	4.84	0.81	0.45	12	30	213	2.43	16	1.27	39				NO
46	Grade 4	14.5	282	8.5	0.7	0.2	58	58	312	3	13	0.9	32	7.1			NO
47	Grade 1	11.7	197	10.2	0.38	0.16	23	22	163	4.43	13.1	0.66	28				NO
48	Grade 4	12.4	260	8.4	0.32	0.06	21	17	130	3.82	11.7	0.64	21				NO
49	Grade 3	13.5	254	15.9	0.84	0.21	152	274	207	3.79	14.21	0.68	32				NO

S. No.	Name	Age	Sex	MRD Number	Diabetes Mellitus	Hypertension	CAD	PCOD	OSA	Thyroid Disease	TB	History of Previous Adbdominal Surgery	Primary Diagnosis	Thick Walled Gallbladder (>3 mm)	CBD Dilalation (> 6mm)	ERCP	Type of Admission	ASA Score	Pre-Operative Risk Scale	Risk Scale gp
50	S	33	Female	252826	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	0	1
51	SK	57	Female	1489987	Yes	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Emergency	3	11	3
52	NS	16	Female	809249	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Elective	1	6	2
53	S	36	Female	1489634	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	2	1	1
54	NS	78	Male	1488599	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Emergency	1	10	3
55	JS	60	Male	1448366	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	2	4	2
56	GS	52	Male	1352056	No	No	No	No	No	No	No	No	Choledocolithiasis	No	Yes	Yes	Delayed	1	6	2
57	SK	69	Female	1488694	No	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	3	3	2
58	AK	42	Female	1488125	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	1	1
59	AS	47	Male	1480842	No	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	3	4	2
60	JS	59	Male	1480096	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Emergency	3	12	3
61	R	41	Female	378374	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	2	2
62	VPK	51	Female	1484259	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	2	2
63	R	16	Female	1480095	No	No	No	No	No	No	No	No	Choledocolithiasis	No	Yes	Yes	Emergency	1	5	2
64	SK	64	Male	1479846	Yes	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	3	5	2
65	SD	62	Female	1474002	No	Yes	No	No	No	No	No	Yes	Cholecystitis	Yes	Yes	Yes	Emergency	2	12	3
66	MK	32	Female	1403223	Yes	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Delayed	2	6	2
67	PDE	70	Female	1534631	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	2	2
68	JK	66	Female	1165931	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	2	9	3
69	A	23	Female	1035223	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
70	RG	52	Female	1025328	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	1	1
71	VR	58	Female	1582681	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Elective	2	8	3
72	HS	33	Male	1064564	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	2	2
73	PM	30	Female	1552054	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	2	2
74	M	49	Female	1575677	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	2	3	2
75	NK	38	Female	1565311	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
76	BD	48	Female	996937	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	3	2
77	RK	63	Female	1545573	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	3	2
78	NB	35	Male	560899	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	2	3	2
79	DK	51	Female	1571920	Yes	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	2	2
80	RS	43	Female	1535169	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	3	4	2
81	PS	28	Female	788234	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	2	2
82	SR	48	Female	139010	No	No	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Elective	2	4	2
83	SK	45	Female	1502775	No	No	No	No	No	No	No	No	Biliary Colic	No	Yes	Yes	Delayed	2	5	2
84	RKS	56	Male	1109469	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	3	2
85	GR	69	Male	1586322	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	3	2
86	RK	66	Female	227071	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Delayed	1	6	2
87	BJ	57	Female	593671	No	No	No	No	No	No	No	No	Cholecystitis	No	Yes	No	Elective	1	6	2
88	SK	52	Female	1591419	No	No	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Delayed	2	5	2
89	SK	37	Male	1499885	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	2	2
90	N	36	Female	1462585	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Elective	1	6	2
91	NE	47	Female	1376624	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	2	2
92	AK	37	Female	163688	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	2	2
93	RC	23	Male	1589700	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
94	S	28	Male	1548660	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
95	SG	48	Female	1529407	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Elective	1	7	3
96	MK	60	Female	1325190	No	No	Yes	No	No	No	No	No	Cholecystitis	Yes	No	No	Elective	2	8	3
97	MK	28	Female	1458289	No	No	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Delayed	1	3	2
98	SD	41	Female	1396202	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	2	2

S. No.	Intra-Operative Scale	CBC: Hmg	CBC: Platelets	CBC: TLC	Lft:Bilrubin Total	Lft:Bilrubin Direct	Lft:SG/OT	Lft:SG/PT	Lft:ALP	Lft:Serum Albumin	PTI	RFT:Serum Creatinine	RFT: Serum Urea	HbA1c	S. Amylase	S. Lipase	Converted to open
50	Grade 1	12.5	262	6.5	0.59	0.13	22	15	92	4.28	10.6	0.49	22				NO
51	Grade 4	9.4	190	10.4	0.47	0.11	15	18	229	2.8	13.6	0.62	31	9.4			NO
52	Grade 3	11	210	13.2	0.49	0.21	14	17	78	3.5	11.2	0.78	28				NO
53	Grade 1	11.7	292	8	1.08	0.34	17	30	125	4.27	12.2	0.54	14				NO
54	Grade 4	15.4	201	9.1	0.49	0.08	40	26	78	3.31	12.8	0.88	30		64	20	NO
55	Grade 2	13.6	170	8.5	0.54	0.22	18	18	76	3.88	11.6	0.66	23		46	16	NO
56	Grade 3	13.4	236	7.9	1.1	0.5	21	17	160	3.5	12.5	0.7	25				NO
57	Grade 1	13.1	342	6.6	0.47	0.06	14	10	100	4.05	11.2	0.75	24.9	6.2			NO
58	Grade 3	11.7	192	4.6	0.96	0.6	13	71	65	4.13	12.1	0.71	16				NO
59	Grade 2	11.9	225	8.12	0.24	0.13	15	17	130	3.92	12.7	0.78	20				NO
60	Grade 4	12.7	205	12.5	1.6	1.26	43	51	232	2.99	15.2	0.68	28		663	1013	NO
61	Grade 2	10.3	141	5.8	0.51	0.11	45	39	122	4.8	14	0.8	23				NO
62	Grade 2	12.7	327	6.26	12	0.24	28	24	84	3.25	11.3	0.65	18				NO
63	Grade 1	11.4	240	7.9	1.36	0.56	41	67	110	4.07	12.1	0.9	28				NO
64	Grade 3	10.1	140	4.82	0.26	0.05	18	17	87	3.72	10.3	1.03	51	7.2			NO
65	Grade 3	14	340	10.39	1.04	0.19	23	17	100	4.1	12.8	0.81	20				NO
66	Grade 2	10.8	279	7.6	0.26	0.14	24	39	78	4.1	12	0.6	25	9.5			NO
67	Grade 2	11.6	220	12.5	0.46	0.06	27	15	128	3.5	10	0.88	22				NO
68	Grade 4	9.9	268	18.9	2.63	1.38	34	79	553	3.5	13.7	0.73	68				NO
69	Grade 1	9.8	282	6.8	1.84	1.07	75	94	426	3.2	12.1	0.36	12				NO
70	Grade 1	10.3	130	10.2	0.51	0.11	45	39	122	2.9	10.8	0.65	43				NO
71	Grade 4	12.8	152	8.6	12	0.24	28	24	84	3.4	12.5	0.54	12				NO
72	Grade 2	15.5	311	6.67	1	0.7	37	33	102	4.1	11.5	0.91	16				NO
73	Grade 2	11.6	260	5.6	0.37	0.02	36	33	104	2.1	12	0.48	19				NO
74	Grade 2	13.6	286	8.4	0.66	0.11	40	74	164	4.1	10.4	0.68	33				NO
75	Grade 1	13.4	234	8.6	0.65	0.23	32	42	114	2.75	11.4	0.66	28				NO
76	Grade 1	12.3	282	7.7	0.41	0.17	12	13	87	4.06	11.7	0.68	21				NO
77	Grade 1	8.4	351	8.6	0.16	0.1	16	16	71	3.8	11	1.3	49				NO
78	Grade 2	13.1	142	7	0.33	0.15	14	27	97	3.9	11.7	0.83	30				NO
79	Grade 1	12	173	14	0.32	0.2	58	60	144	4.2	11.8	0.76	34	11.2			NO
80	Grade 1	11	200	5.9	0.22	0.11	19	23	110	3.6	10.9	0.59	20				NO
81	Grade 1	12	262	7.1	0.23	0.11	14	16	128	4.6	13.8	0.54	31				NO
82	Grade 1	10.8	266	6.49	0.7	0.35	14	12	100	3.9	12.9	0.76	21				NO
83	Grade 1	11.3	658	19	0.41	0.21	17	20	70	3.75	11.5	0.61	18				NO
84	Grade 2	13.1	180	7.3	0.49	0.21	45	57	73	4.01	10.5	0.84	24				NO
85	Grade 2	12.8	90	6.7	1.11	0.4	31	30	59	3.45	12.3	0.79	29				NO
86	Grade 3	10.2	227	10.3	0.65	0.28	24	29	74	3.65	12.5	0.49	24				NO
87	Grade 3	13.4	188	9.6	0.28	0.15	11	12	64	4.12	12.7	0.75	19				NO
88	Grade 2	12.4	314	11.6	0.58	0.23	38	97	174	4.2	11.8	0.97	30				NO
89	Grade 2	13.1	120	6.7	1.34	0.54	36	48	115	3.8	13.2	0.69	22				NO
90	Grade 3	11.4	150	6.3	0.72	0.27	12	9	84	4.12	11.1	0.66	17				NO
91	Grade 1	8	296	3.67	0.41	0.19	21	16	179	2.9	11.5	0.75	20				NO
92	Grade 2	13.9	308	12.33	0.64	0.11	22	20	74	4.3	12.2	0.61	14				NO
93	Grade 1	13.7	276	5.25	0.29	0.15	29	49	420	4.27	12.4	0.79	10				NO
94	Grade 1	13.6	241	5.4	1.28	0.39	22	21	92	3.31	11.5	0.93	16				NO
95	Grade 3	11.4	232	10	0.12	0.23	14	20	102	3.65	11.2	0.72	22				NO
96	Grade 4	10.6	391	8.03	0.2	0.11	17	22	156	4.3	11.8	1.14	32				NO
97	Grade 1	9.4	157	5.9	0.5	0.1	14	11	95	4.12	12.1	0.7	26				NO
98	Grade 1	8.5	175	9.5	0.23	0.14	15	10	69	3.25	12	0.71	34				NO

S. No.	Name	Age	Sex	MRD Number	Diabetes Mellitus	Hypertension	CAD	PCOD	OSA	Thyroid Disease	TB	History of Previous Adbdominal Surgery	Primary Diagnosis	Thick Walled Gallbladder (>3 mm)	CBD Dilalation (> 6mm)	ERCP	Type of Admission	ASA Score	Pre-Operative Risk Scale	Risk Scale gp
99	SSS	64	Male	1481650	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Emergency	2	11	3
100	AK	69	Male	1480170	No	No	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Delayed	2	6	2
101	JS	42	Male	1487981	No	No	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Delayed	2	6	2
102	MK	25	Female	1558660	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	2	2
103	AS	53	Male	1528844	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	3	2
104	KM	72	Male	1455445	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	2	2
105	KK	55	Female	1637673	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
106	AC	36	Female	166782	No	No	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Delayed	1	3	2
107	C	50	Female	1570523	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Delayed	2	9	3
108	PN	38	Male	1644242	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	3	2
109	SD	29	Female	1543351	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
110	NJ	37	Female	1454984	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	1	1
111	ACR	72	Male	1320893	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Emergency	2	11	3
112	S	40	Female	1548189	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Delayed	1	6	2
113	RR	44	Female	1591445	No	No	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Emergency	2	6	2
114	GS	40	Male	1588156	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	3	2
115	VS	26	Female	1540503	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	2	2
116	A	60	Female	1528268	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	2	2
117	MK	44	Female	1499310	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Delayed	1	6	2
118	B	48	Male	1133500	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Delayed	2	10	3
119	P	32	Female	544983	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	2	2	2
120	SD	64	Female	557237	No	No	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Elective	1	3	2
121	SG	72	Male	1396101	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	2	2
122	SS	66	Female	1448527	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	3	2
123	SR	65	Female	1582617	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Emergency	3	9	3
124	SG	44	Male	1572306	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	3	2
125	ODS	71	Male	1085689	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	2	2
126	HS	72	Male	1468364	No	No	No	No	No	No	No	Yes	Biliary Colic	Yes	No	No	Elective	2	5	2
127	MS	33	Female	280530	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	2	2	2
128	MK	63	Female	1466872	No	Yes	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Delayed	2	5	2
129	SD	58	Female	1426546	Yes	No	No	No	No	Yes	No	No	Cholecystitis	Yes	No	No	Delayed	2	9	3
130	MM	33	Female	1240195	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	2	8	3
131	MS	32	Female	1468676	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	1	1
132	KD	48	Female	1235415	Yes	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	3	4	2
133	TS	27	Female	1264911	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Elective	1	6	2
134	KS	67	Female	1473428	Yes	Yes	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Emergency	3	11	3
135	KS	59	Female	1477007	No	Yes	No	No	No	No	No	No	Cholecystitis	No	No	No	Elective	2	6	2
136	RK	34	Female	1510473	No	No	No	No	No	Yes	No	No	Pancreatitis	Yes	No	No	Elective	2	3	2
137	R	37	Female	616998	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	1	1
138	KD	59	Female	1510222	Yes	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	3	4	2
139	MS	49	Male	1511431	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	2	4	2
140	HK	56	Female	1522507	Yes	No	No	No	No	Yes	No	Yes	Biliary Colic	No	No	No	Elective	2	2	2
141	SS	54	Female	913735	No	No	No	No	No	No	No	No	Cholecystitis	Yes	Yes	Yes	Emergency	1	11	3
142	RG	18	Female	1480753	No	No	No	Yes	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	1	1
143	RS	45	Male	1462700	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	2	4	2
144	RK	63	Male	1501224	Yes	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	4	2
145	MK	30	Male	1465342	No	No	No	No	No	No	No	No	Choledocolithiasis	No	Yes	Yes	Delayed	1	5	2
146	KS	53	Female	1505101	Yes	No	Yes	No	No	Yes	No	Yes	Biliary Colic	No	No	No	Delayed	3	4	2
147	SR	63	Female	1126780	Yes	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	2	3	2

S. No.	Intra-Operative Scale	CBC: Hmg	CBC: Platelets	CBC: TLC	Lft:Bilrubin Total	Lft:Bilrubin Direct	Lft:SG/OT	Lft:SG/PT	Lft:ALP	Lft:Serum Albumin	PTI	RFT:Serum Creatinine	RFT: Serum Urea	HbA1c	S. Amylase	S. Lipase	Converted to open
99	Grade 4	10.8	481	12.7	0.34	0.07	16	10	123	3.75	11.2	0.9	29				NO
100	Grade 3	14	207	8.2	0.6	0.21	17	10	105	4.25	12.3	1.23	23				NO
101	Grade 2	14.4	270	10.6	0.71	0.23	26	15	104	4.1	13.1	0.71	26				NO
102	Grade 3	13.7	281	8.1	0.5	0.11	32	45	75	3.8	11.7	0.81	25				NO
103	Grade 2	13.4	180	6.91	0.44	0.08	21	20	61	4.3	11.5	1.11	36				NO
104	Grade 3	12.3	156	4.1	0.21	0.3	22	24	102	3.65	11.3	1.04	20				NO
105	Grade 1	9.7	187	13.5	0.35	0.14	23	15	118	4.42	11.8	1.15	59				NO
106	Grade 2	12.8	378	6.7	1.15	0.39	22	27	76	4.43	11.5	0.72	14				NO
107	Grade 3	13.2	241	6.7	0.88	0.19	38	20	109	3.82	14.5	0.74	27				NO
108	Grade 2	13.1	221	8	0.44	0.19	28	34	79	3.85	11.2	0.72	25				NO
109	Grade 1	12	219	7.3	0.12	0.75	17	22	95	4.1	11	1.01	20				NO
110	Grade 1	12	160	7.7	0.48	0.08	17	14	65	2.8	11.5	0.56	30				NO
111	Grade 4	10.7	234	13.6	0.99	0.38	18	25	88	3.84	12.2	1	33				NO
112	Grade 3	13.1	231	8.1	0.4	0.08	26	30	111	4.2	10.7	0.61	23				NO
113	Grade 2	12.9	317	9.61	1.45	0.27	22	19	115	4.1	11.8	1.8	22				NO
114	Grade 3	13.7	239	8.8	0.43	0.08	52	89	105	4.3	10.4	0.85	44				NO
115	Grade 2	13.4	130	8	1.3	0.3	17	23	257	4.16	11	0.9	26				NO
116	Grade 1	12	228	10.3	0.56	0.1	29	42	68	4.19	10.9	0.69	31				NO
117	Grade 3	11	349	5.77	0.62	0.09	28	34	61	3.6	11.1	0.78	22				NO
118	Grade 4	14.7	130	3.1	1.91	0.62	19	23	66	2.8	12.6	0.95	19				NO
119	Grade 2	13.2	228	5.6	1.16	0.4	26	31	98	3.6	13.5	0.59	13				NO
120	Grade 2	9.2	193	7.1	0.18	0.07	12	10	120	4.32	11.1	2.89	75				NO
121	Grade 3	11	183	7.99	0.41	0.08	22	14	51	2.43	11.2	0.85	29				NO
122	Grade 2	11.8	379	8.27	0.18	0.48	21	24	110	3	11.3	0.72	13				NO
123	Grade 4	11	211	5.26	0.21	0.31	16	21	104	4.25	12.1	0.79	15				NO
124	Grade 2	13.5	314	11.8	1.46	0.25	23	36	94	3.9	11.3	0.9	35				NO
125	Grade 3	9.4	232	7.1	0.31	0.08	29	13	96	4.3	11.8	1.08	18				NO
126	Grade 2	10.7	152	4.4	0.18	0.45	85	43	163	3.96	13.1	0.96	23				NO
127	Grade 4	10.9	152	12.78	1.34	0.47	296	535	78	4.63	12.4	0.73	16				YES
128	Grade 2	10.1	131	4.1	1.59	0.41	168	108	121	2.87	13.31	0.36	18				NO
129	Grade 4	11.2	224	9.9	0.68	0.24	26	26	162	4.5	12.3	0.76	28	8.6			YES
130	Grade 3	11.2	184	6.1	0.32	0.1	17	9	95	4.4	12.2	0.7	26				NO
131	Grade 2	13.6	180	5.89	0.7	0.23	16	12	81	4.78	11.6	0.66	30				NO
132	Grade 2	12.8	110	3.6	1.28	0.47	36	36	78	4.65	12.3	0.55	24	9	40	20	NO
133	Grade 3	14.4	347	11.4	1.14	0.28	20	22	82	4.52	12.3	0.53	15		29	40	NO
134	Grade 4	11.1	150	8.8	0.9	0.35	25	26	95	4.12	15.8	0.8	39	9.8			YES
135	Grade 2	10.9	280	8	0.41	0.1	28	13	98	4	11.5	1	40				NO
136	Grade 2	10.1	265	8.1	0.57	0.33	33	148	208	3.14	14.5	0.73	20				NO
137	Grade 1	10.1	199	7.7	0.51	0.08	28	17	60	4.2	11.2	0.6	16				NO
138	Grade 3	11.5	277	6.4	0.3	0.07	41	47	48	3.29	11.4	0.78	34	10.2			NO
139	Grade 2	11.9	142	8.9	1.18	0.21	149	177	148	4.38	11.3	0.91	24		836	1125	NO
140	Grade 3	11.6	178	4.3	0.18	0.09	19	7	110	3.93	0.1	0.49	23				NO
141	Grade 4	10.4	148	7.08	0.7	0.5	32	22	136	3.64	13.3	0.54	17				NO
142	Grade 2	13.6	302	9.48	0.53	0.11	34	92	122	3.91	12.6	0.65	25				NO
143	Grade 3	10.4	415	7.7	0.49	0.06	35	32	170	3.5	13.1	1.1	46				NO
144	Grade 3	14.2	200	7	0.33	0.07	30	29	82	3.63	11.1	0.55	21				NO
145	Grade 3	13	273	8.4	1.65	0.3	24	19	60	3.96	16.7	0.5	19				NO
146	Grade 2	12.2	264	9.9	0.6	0.25	20	12	98	4.15	11.9	0.6	18	7.8			NO
147	Grade 2	11.6	130	9.4	0.27	0.06	16	17	90	3.78	11.6	0.63	34	6.5			NO

S. No.	Name	Age	Sex	MRD Number	Diabetes Mellitus	Hypertension	CAD	PCOD	OSA	Thyroid Disease	TB	History of Previous Adbdominal Surgery	Primary Diagnosis	Thick Walled Gallbladder (>3 mm)	CBD Dilalation (> 6mm)	ERCP	Type of Admission	ASA Score	Pre-Operative Risk Scale	Risk Scale gp
148	DS	82	Male	1500601	Yes	No	No	No	No	No	No	No	Choledocolithiasis	No	Yes	Yes	Elective	2	6	2
149	SD	47	Female	1508367	Yes	No	No	No	No	No	No	Yes	Cholecystitis	No	No	No	Elective	1	5	2
150	PK	51	Female	1411976	No	Yes	No	No	No	No	No	No	Biliary Colic	Yes	No	No	Delayed	3	6	2
151	S	47	Female	1509282	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	1	8	3
152	UK	56	Female	1242418	Yes	No	No	No	No	No	Yes	Yes	Biliary Colic	No	No	No	Delayed	3	4	2
153	RK	23	Female	1081591	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
154	SS	19	Male	1454648	No	No	No	No	No	No	No	Yes	Biliary Colic	Yes	No	No	Delayed	2	5	2
155	SK	38	Female	1508216	No	No	No	No	No	No	No	Yes	Choledocolithiasis	No	Yes	Yes	Emergency	1	5	2
156	MS	56	Male	251781	Yes	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	3	2
157	BS	74	Male	1517622	Yes	Yes	Yes	No	No	No	No	No	Biliary Colic	Yes	No	No	Elective	3	6	2
158	VK	58	Male	1517462	No	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	3	2
159	GK	52	Female	1516565	No	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	3	3	2
160	HK	24	Female	1518825	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
161	SR	74	Female	1517747	Yes	Yes	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	3	3	2
162	SPK	70	Female	1519978	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Elective	3	7	3
163	RS	74	Male	447648	Yes	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Delayed	2	8	3
164	K	63	Female	1393742	Yes	Yes	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	3	10	3
165	S	26	Female	1383114	Yes	No	No	No	No	Yes	No	Yes	Pancreatitis	No	No	No	Emergency	1	2	2
166	M	35	Female	1383752	No	No	No	No	No	No	No	Yes	Cholecystitis	No	No	No	Emergency	2	7	3
167	RP	63	Female	1309703	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	2	3	2
168	KK	61	Female	1384384	No	Yes	No	No	No	No	No	Yes	Choledocolithiasis	Yes	Yes	Yes	Elective	1	6	2
169	P	69	Female	1385123	No	No	No	No	No	No	No	No	Cholecystitis	No	Yes	No	Emergency	3	10	3
170	DK	30	Female	1367653	No	No	No	No	No	No	No	Yes	Pancreatitis	No	No	No	Elective	1	0	1
171	KL	55	Male	1507292	Yes	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	3	2
172	GS	46	Male	1276631	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	2	2
173	SKJ	65	Male	910249	No	Yes	Yes	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	3	4	2
174	JK	67	Female	312327	No	Yes	No	No	No	No	No	Yes	Pancreatitis	No	No	No	Delayed	3	4	2
175	S	23	Female	4027	No	No	No	No	No	No	No	No	Choledocolithiasis	No	Yes	Yes	Delayed	1	4	2
176	SK	60	Female	732859	No	Yes	No	No	No	Yes	No	Yes	Biliary Colic	No	No	No	Delayed	2	3	2
177	KC	32	Female	840754	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	2	1	1
178	KK	58	Female	1624186	No	Yes	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	2	2	2
179	R	38	Female	697731	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	0	1
180	P	46	Female	85544	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Elective	1	5	2
181	BRK	59	Male	1444615	Yes	Yes	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Elective	2	9	3
182	AS	37	Male	766129	No	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Emergency	3	5	2
183	AB	38	Female	1442930	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
184	NK	28	Female	1438425	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Emergency	1	8	3
185	SS	42	Female	1517098	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Elective	1	5	2
186	AP	30	Male	1305973	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Elective	2	2	2
187	RK	57	Female	1527763	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	1	2	2
188	SS	54	Female	1517165	No	No	Yes	No	No	No	No	Yes	Cholecystitis	No	No	No	Delayed	3	8	3
189	RM	38	Female	990315	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Emergency	2	9	3
190	KK	56	Female	1530228	Yes	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Delayed	3	8	3
191	JK	55	Female	1529385	No	No	No	No	No	Yes	No	No	Biliary Colic	No	No	No	Delayed	2	3	2
192	AS	15	Male	1527891	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
193	RK	36	Female	1462166	No	No	No	No	No	No	No	Yes	Choledocolithiasis	No	Yes	Yes	Emergency	2	6	2
194	LS	29	Female	1413792	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Elective	1	4	2
195	AB	22	Female	1223920	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
196	VK	60	Male	1460521	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Emergency	2	11	3

S. No.	Intra-Operative Scale	CBC: Hmg	CBC: Platelets	CBC: TLC	Lft:Bilrubin Total	Lft:Bilrubin Direct	Lft:SG/OT	Lft:SG/PT	Lft:ALP	Lft:Serum Albumin	PTI	RFT:Serum Creatinine	RFT: Serum Urea	HbA1c	S. Amylase	S. Lipase	Converted to open
148	Grade 3	11	222	7.8	0.39	0.1	38	41	55	2.3	13.4	0.68	21	8.4	69	33	NO
149	Grade 3	10.5	504	8.3	0.56	0.15	14	9	93	3.16	16.6	0.84	22		62	23	NO
150	Grade 3	12.8	250	5.42	0.3	0.09	45	49	90	3.52	11.5	0.68	29				NO
151	Grade 4	12.6	160	8.28	0.7	0.14	45	55	94	4.68	10.8	0.61	28				NO
152	Grade 2	7.3	150	17.5	0.9	0.28	23	25	173	2.69	13	1.74	45	7.9			NO
153	Grade 1	8.1	154	6	0.29	0.05	30	25	135	3.81	12.4	0.62	16				NO
154	Grade 4	14.8	273	10.3	2.43	1.71	71	174	144	3.23	14.8	0.65	19		18	24	YES
155	Grade 3	12.2	219	9.6	4.73	3.54	324	391	276	4.19	12.6	0.64	11		32	23	NO
156	Grade 2	14.2	199	11.3	0.72	0.13	286	377	145	4.64	11.7	0.8	32	6.5			NO
157	Grade 3	11.7	255	5.7	0.81	0.1	25	28	65	3.22	11.7	1.34	49	7.9			NO
158	Grade 3	14.6	140	7.7	0.6	0.24	28	24	110	4.37	11.6	0.91	20				NO
159	Grade 2	11.1	120	5.98	0.63	0.11	20	13	96	4.22	11.9	0.69	40				NO
160	Grade 1	12.3	290	7.6	0.31	0.13	40	48	86	4.14	12.2	0.88	22				NO
161	Grade 2	11.5	262	7.6	0.35	0.06	15	11	76	3.58	12.4	0.79	23	8.1			NO
162	Grade 3	12	297	7.43	0.44	0.15	16	9	110	4.18	11.5	0.46	22				NO
163	Grade 3	11.3	200	5.3	0.98	0.33	41	48	114	4.24	11.3	0.83	25	10.8			NO
164	Grade 4	11	210	9.8	0.56	0.3	30	35	80	3.9	11.2	0.95	29	8.5			NO
165	Grade 1	10.7	188	12	0.78	0.48	17	39	79	4.2	12.1	0.36	6	9.5	180	337	NO
166	Grade 4	10.6	349	8.79	0.83	0.22	63	41	149	4.1	11.2	0.64	19	6.9	85	86	NO
167	Grade 1	12.5	231	9.5	0.21	0.07	20	15	145	3.94	11.4	0.78	17		71	39	NO
168	Grade 2	10.5	211	6.3	1.2	0.6	32	45	123	3.8	13.2	0.9	18				NO
169	Grade 4	11.9	314	6	0.5	0.12	43	57	162	3.95	12.1	0.6	19				NO
170	Grade 1	12	209	7.9	0.6	0.27	18	40	110	4.1	10.9	0.85	42		45	32	NO
171	Grade 2	13.5	220	8.6	0.75	0.25	30	32	90	3.7	12.9	0.7	12	7.5			NO
172	Grade 1	12	210	7.8	0.39	0.15	45	40	60	4.5	13.1	0.68	22				NO
173	Grade 2	11	250	8.1	0.3	0.11	20	21	101	4.3	11.8	1.14	32				NO
174	Grade 2	9.4	130	6.1	0.5	0.14	14	15	95	4.12	11.28	0.7	30				NO
175	Grade 1	11	180	9.5	0.23	0.14	21	10	70	4.21	10.7	0.65	30				NO
176	Grade 2	10.8	780	11.1	0.34	0.18	22	30	95	3.75	12.5	0.45	34				NO
177	Grade 3	14	207	8.2	0.6	0.21	17	10	105	4.25	12.3	1.23	23				NO
178	Grade 1	9.5	350	7.5	0.71	0.23	32	21	75	4.1	12.1	0.71	26				NO
179	Grade 1	11.5	245	8.1	0.44	0.11	21	20	80	4.15	11.9	0.9	30				NO
180	Grade 2	12.5	161	6.61	0.68	0.09	26	26	85	4.29	11.5	0.78	24				NO
181	Grade 3	14.7	164	8.8	0.81	0.25	21	32	118	4.23	13	0.7	24	6.75			NO
182	Grade 4	14.5	212	5.58	0.54	0.28	328	164	142	5.3	11.1	1.03	26				NO
183	Grade 1	12.7	142	9.8	0.33	0.09	39	41	98	4.57	11	0.7	23				NO
184	Grade 4	13.3	191	17.86	0.73	0.13	32	38	113	4.27	12	0.59	20		20	8	NO
185	Grade 3	10.1	230	10	0.51	0.08	28	39	83	4.24	10.9	0.82	22				NO
186	Grade 2	11.9	262	7.7	1.2	0.19	32	38	112	4.03	11	1.08	17		42	56	NO
187	Grade 2	12.5	163	6.4	0.49	0.11	27	25	87	4.11	11.5	0.61	21				NO
188	Grade 4	11.6	295	6.1	0.52	0.13	22	27	172	3.84	11.5	0.54	22				NO
189	Grade 3	13.4	368	12.8	1.2	0.4	28	35	110	4.1	12.1	0.62	21				NO
190	Grade 3	14.9	263	6.99	0.35	0.11	30.8	58.7	147	4.57	13.4	0.6	27.6	9.2			NO
191	Grade 2	10.7	272	8.16	0.5	0.1	46	52	876.3	3.4	11.1	0.5	21				NO
192	Grade 1	11.1	453	9.1	0.28	0.06	23	29	141	3.75	15.9	0.59	18				NO
193	Grade 3	13.4	306	6.08	1.39	1.01	268	341	216	4.42	12.31	0.8	32				NO
194	Grade 3	12.8	297	10.2	0.95	0.19	17	13	82	4.16	0.56	0.54	18		22	64	NO
195	Grade 1	10.2	70	7.16	0.32	0.1	22	20	80	4.22	12.8	0.54	28				NO
196	Grade 4	13.8	150	7	2.16	0.66	22	21	103	4.15	12.1	0.9	25				NO

S. No.	Name	Age	Sex	MRD Number	Diabetes Mellitus	Hypertension	CAD	PCOD	OSA	Thyroid Disease	TB	History of Previous Adbdominal Surgery	Primary Diagnosis	Thick Walled Gallbladder (>3 mm)	CBD Dilalation (> 6mm)	ERCP	Type of Admission	ASA Score	Pre-Operative Risk Scale	Risk Scale gp
197	GS	59	Male	1457510	Yes	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	3	4	2
198	KD	58	Female	1464995	No	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	2	9	3
199	JK	47	Female	8992	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
200	SD	62	Female	1471755	Yes	Yes	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	2	9	3
201	SK	37	Female	150914	No	Yes	No	No	No	No	No	Yes	Choledocolithiasis	Yes	Yes	Yes	Emergency	3	9	3
202	SK	57	Female	1476470	No	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	3	3	2
203	S	56	Female	1471394	No	No	No	No	No	No	No	No	Pancreatitis	No	No	No	Elective	3	3	2
204	BK	50	Female	1477393	Yes	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	2	2	2
205	RK	60	Female	1469735	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Emergency	3	9	3
206	RA	35	Female	741422	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	2	1	1
207	AM	35	Male	1447456	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	2	2
208	AD	32	Female	1465828	Yes	No	No	No	No	No	No	Yes	Pancreatitis	Yes	No	No	Delayed	3	5	2
209	NG	35	Female	1349887	No	No	No	No	No	No	No	Yes	Biliary Colic	Yes	No	No	Delayed	2	4	2
210	AR	42	Female	1497071	No	No	No	No	No	No	No	Yes	Biliary Colic	Yes	No	No	Delayed	1	4	2
211	JK	28	Female	1082542	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Delayed	2	2	2
212	SS	59	Female	1504434	No	Yes	No	No	No	No	No	No	Choledocolithiasis	No	Yes	Yes	Delayed	2	6	2
213	DS	37	Female	1499897	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
214	P	48	Female	1415074	No	No	No	No	No	No	No	Yes	Biliary Colic	No	Yes	No	Elective	2	3	2
215	HK	55	Female	1488514	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	2	2
216	LR	65	Male	1461019	Yes	Yes	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	2	4	2
217	CD	45	Female	3620	No	No	No	No	No	Yes	No	No	Cholecystitis	No	No	No	Elective	2	6	2
218	PM	45	Female	1513968	No	Yes	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	2	2	2
219	ND	63	Female	604953	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	2	2	2
220	P	43	Female	1596424	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
221	A	27	Female	1614260	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	0	1
222	SK	54	Female	1614606	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
223	RK	64	Female	11390572	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	1	1
224	MC	20	Male	1593108	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	1	1
225	MH	57	Male	1612035	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Emergency	1	8	3
226	AS	36	Male	802828	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Delayed	1	8	3
227	S	59	Male	1538183	No	No	No	No	No	No	No	No	Cholecystitis	Yes	No	Yes	Delayed	2	11	3
228	JS	49	Male	1572031	No	Yes	No	No	No	No	No	No	Pancreatitis	No	No	No	Delayed	3	5	2
229	SR	49	Female	1577235	Yes	No	No	No	No	No	No	Yes	Cholecystitis	Yes	No	No	Delayed	2	9	3
230	NB	38	Female	1565497	Yes	Yes	No	No	No	No	No	Yes	Pancreatitis	Yes	Yes	No	Emergency	4	12	3
231	SS	36	Female	1585563	No	No	No	No	No	Yes	No	No	Biliary Colic	No	No	No	Delayed	2	2	2
232	SP	41	Female	1586414	No	No	No	No	No	No	No	Yes	Biliary Colic	No	No	No	Elective	1	1	1
233	KK	59	Female	388319	No	Yes	No	No	No	No	No	Yes	Cholecystitis	Yes	Yes	No	Delayed	2	10	3
234	HD	78	Male	888108	Yes	Yes	No	No	No	No	No	No	Cholecystitis	Yes	No	No	Emergency	3	12	3
235	SS	26	Male	165183	No	No	No	No	No	No	Yes	No	Biliary Colic	No	No	No	Elective	1	1	1
236	BR	58	Female	1567858	Yes	Yes	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	3	4	2
237	H	31	Female	308857	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	1	1
238	HS	42	Male	1568039	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	3	5	2
239	AK	80	Female	1561587	No	No	No	No	No	No	No	Yes	Cholecystitis	No	No	No	Emergency	3	9	3
240	DK	62	Female	1542478	No	Yes	Yes	No	No	No	No	No	Biliary Colic	No	No	No	Delayed	1	2	2
241	KB	26	Female	1478123	No	No	No	No	No	No	No	No	Biliary Colic	No	No	No	Elective	1	0	1
242	K	18	Female	1561647	No	No	No	No	No	No	No	No	Cholecystitis	No	No	No	Emergency	1	6	2
243	NK	53	Female	1561686	No	No	No	No	No	No	No	No	Choledocolithiasis	Yes	Yes	No	Emergency	1	7	3
244	BS	56	Male	1560294	No	No	No	No	No	No	No	No	Pancreatitis	Yes	No	No	Delayed	1	5	2

S. No.	Intra-Operative Scale	CBC: Hmg	CBC: Platelets	CBC: TLC	Lft:Bilrubin Total	Lft:Bilrubin Direct	Lft:SG/OT	Lft:SG/PT	Lft:ALP	Lft:Serum Albumin	PTI	RFT:Serum Creatinine	RFT: Serum Urea	HbA1c	S. Amylase	S. Lipase	Converted to open
197	Grade 2	14.5	195	9.2	0.24	0.11	16.7	22.2	65	4.22	13.41	0.69	37.3	5.3			NO
198	Grade 3	8.7	350	28.8	0.71	0.22	14	8	7	4.71	17.2	0.83	6				NO
199	Grade 1	12.4	176	6.8	0.34	0.05	23	22	71	4.16	10.6	0.55	20				NO
200	Grade 3	11.5	120	7.6	0.6	0.2	20	20	98	4.26	11.2	0.6	30	7.4			NO
201	Grade 3	0.9	217	5.3	20.6	1.5	218	225	438	4.06	12.1	0.84	26		88	80	NO
202	Grade 2	10.8	328	7.3	0.5	0.14	35	31	276	4.1	12.5	1.22	30		74.7	64.9	NO
203	Grade 2	10.7	110	17.85	3.87	2.22	82	75	187	3.65	11.9	0.48	9		996	839	NO
204	Grade 2	8.9	244	8.3	0.24	0.02	15	15	94	3.1	9.8	0.84	38				NO
205	Grade 4	6.2	282	10.3	0.36	0.19	26	10	89	3.34	15.62	2.93	63				NO
206	Grade 1	11.9	326	8.8	0.65	0.72	14	19	118	4.49	12.2	0.56	19				NO
207	Grade 2	15.1	268	4.7	1.3	0.3	19	35	130	4.25	11.5	0.7	18				NO
208	Grade 3	9.7	536	10.5	0.68	0.16	63	79	1309	3.43	13.2	0.42	11				NO
209	Grade 2	11.4	207	5.24	0.37	0.08	19	16	4.29	4.29	12.1	0.54	23				NO
210	Grade 2	10.4	292	10.54	0.5	0.1	46	79	79	3.87	12	0.49	160				NO
211	Grade 2	9.4	150	2.69	0.38	0.07	30	27	93	4.18	13.6	0.48	26				NO
212	Grade 2	11.8	261	9.1	0.46	0.1	23	16	78	3.32	11.1	0.6	17		79	33	NO
213	Grade 1	12.5	260	9	0.45	0.2	20	18	90	4.2	10.9	0.8	16				NO
214	Grade 2	11	218	6.4	0.22	0.04	24	24	54	3.42	12.4	0.54	12	7	111	31	NO
215	Grade 1	14.7	478	11.4	0.5	0.12	20	43	292	4.2	11.1	1.2	25				NO
216	Grade 2	12.6	257	7.28	0.48	0.17	33	16	81	3.85	11.3	0.86	44	7.5			NO
217	Grade 2	13.2	164	6.8	0.69	0.27	19	19	82	4.08	12.2	0.76	24				NO
218	Grade 2	10.9	234	13.4	0.51	0.1	24	26	68	3.98	10.5	0.5	19				NO
219	Grade 2	11.6	180	9.28	0.34	0.05	21	29	59	4.05	10.3	0.78	35				NO
220	Grade 2	11.5	130	9.4	0.5	0.05	32	42	121	4.2	11.1	0.6	42				NO
221	Grade 1	12.5	180	4.5	1.1	0.7	32	18	92	4.15	12.1	0.72	35				NO
222	Grade 1	13.2	350	6.9	0.34	0.1	32	18	79	4.49	11.6	1.2	11				NO
223	Grade 2	9.8	164	4.6	0.69	0.08	69	35	78	4.2	10.8	0.7	15				NO
224	Grade 1	13.5	270	6.1	0.25	0.06	24	35	18	65	11.4	0.56	32				NO
225	Grade 3	11.9	315	18	0.37	0.16	41	45	87	4.2	13.4	0.56	17				NO
226	Grade 3	10.8	450	11	0.65	0.25	25	35	74	3.8	12.4	0.65	18				NO
227	Grade 4	11.4	160	9.5	1.2	0.4	34	65	180	3.7	11	0.4	36				NO
228	Grade 3	11.5	331	14.9	0.82	0.32	25	33	71	3.03	12.1	0.58	19		214	168	NO
229	Grade 4	11.42	254	7.91	1.8	0.5	68	78	121	4.1	11	0.63	21.6	9.5			NO
230	Grade 4	10.3	187	16.2	2.03	1.05	30	17	80	2.6	14.5	0.74	46	8.7	40	58	NO
231	Grade 2	11.5	188	7.5	0.45	0.05	14	18	75	4.2	10.3	0.65	21				NO
232	Grade 1	10.6	280	6.3	0.54	0.12	18	16	45	4.1	11	0.78	36				NO
233	Grade 4	10.5	156	12.4	0.47	0.08	29	25	98	4	10.1	0.75	28				NO
234	Grade 4	12.7	139	16	1.6	0.4	44	49	215	3.6	10.6	1.3	55				NO
235	Grade 1	11.5	190	33.5	0.64	0.06	12	48	65	4.1	11.9	0.7	36				NO
236	Grade 3	11.5	211	7.2	0.5	0.15	15	14	78	110	10.8	0.65	24	12.1			NO
237	Grade 1	10.8	240	8	0.76	0.05	30	27	268	4.15	10.5	0.75	29				NO
238	Grade 3	12.8	172	10.36	0.58	0.14	97	80	210	3.5	11.5	1.2	29.6	9.2			NO
239	Grade 4	10.8	257	17.4	0.37	0.24	15	11	103	2.34	14.2	3.13	139				NO
240	Grade 2	12.2	189	9.6	0.32	0.07	20	14	75	3.87	11.6	0.7	37				NO
241	Grade 2	11.3	214	6.6	0.31	0.05	21	15	76	4.24	11	0.55	36				NO
242	Grade 3	9.1	180	4.5	0.6	0.15	18	19	72	4.2	10.5	0.6	34				NO
243	Grade 3	12.3	152	9.4	0.31	0.17	25	21	128	4.29	11	0.6	34		121	37	NO
244	Grade 3	14	140	8.71	0.87	0.2	286	675	168	4.4	14.5	0.98	31.8		508	636	NO

Baba Farid University
of Health Sciences
Sadiq Road
Faridkot-151 203 (Pb). INDIA.
Phone : 01639-256232,256236
Tele/Fax : 01639-256235
Email – Thesisbfuhs@gmail.com

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No. BFUHS/2K23p-TH/ 148 **Date** 1/1/24

The Principal
Dayanand Medical College & Hospital
Ludhiana

Subject:: Approval of Plan of Thesis.

This is to inform you that the Faculty of Medical Sciences in its meeting held on 25.09.2023 has approved the plan of thesis of **Prateek Gupta**, a student of your college for **MS General Surgery** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Evaluation of diagnostic performance of a pre-operative scale in predicting difficult laparoscopic cholecystectomy

Supervisor
Dr. Amandeep Singh Nar
Assoc. Professor
Dept. of General Surgery

Co-Supervisor:-
Dr. Atul Mishra
Professor
Dept. of Surgery

The student may submit the thesis in triplicate alongwith the plan in triplicate also, to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She may be directed to attach a photocopy of this letter with the forwarding letter while submitting thesis in the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic, if any.

Controller of Examinations

Note :

1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*

EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF SURGERY

IN

GENERAL SURGERY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

DR. PRATEEK GUPTA

AUGUST, 2022

DEPARTMENT OF GENERAL SURGERY
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY
For the degree of	Master of Surgery
Name of the candidate	Dr. Prateek Gupta
Supervisor	Dr. Amandeep Singh Nar, Associate Professor, Department of General Surgery, DMCH, Ludhiana.
Co-Supervisor	Dr. Ajit Sood, Professor & Head, Department of Gastroenterology, DMCH, Ludhiana Dr. Atul Mishra, Professor, Department of General Surgery, DMCH, Ludhiana.
Institution	Dayanand Medical College and Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Laparoscopic Cholecystectomy has become one of the most common surgical procedures performed worldwide, But when a difficult Cholecystectomy occurs the risk of Bile duct injury is increased up to 10 times resulting in increase in conversion rate, increased bleeding, more postoperative complications and longer surgical time.
A reliable pre-operative scoring system that can be used to predict the difficulty of Laparoscopic Cholecystectomy becomes useful in taking the proper support during surgery and also to inform the patient pre-operatively of the possible difficulties.

Aim of Study: To Evaluate the predictive capacity of a difficult cholecystectomy with a preoperative scale.

Materials & methods: This prospective and observational study will be conducted at DMCH for a time period of one year. The research will move forward after getting approval by Institutional Ethical committee. Patient will be included in the study after taking informed consent.

Clinical Significance: Having a reliable preoperative score that can help in better preparation of challenges associated with difficult Laparoscopic Cholecystectomy becomes a tool for the surgeon to provide the best and the safest treatment to the patient. Patients can also be better prepared for the various outcomes of the procedure.

Keywords: laparoscopic, cholecystectomy, score, pre-operative, Difficult cholecystectomy

(Signature) Candidate | (Signature) Co-supervisor | (Signature) Co-supervisor | (Signature) Supervisor | (Signature) Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** exist in the Department of General Surgery at Dayanand Medical College and Hospital, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate himself under our supervision and guidance.

Supervisor

Dr. Amandeep Singh Nar
Associate Professor
Department of General Surgery
DMCH, Ludhiana

Co-Supervisor's

Dr. Ajit Sood
Professor & Head
Department of Gastroenterology
DMCH, Ludhiana

Dr. Atul Mishra
Professor
Department of General Surgery
DMCH, Ludhiana

Head of the Department

Dr. Jaspal Singh
Professor & Head
Department of General Surgery
DMCH, Ludhiana

Place : _____

Date : _____

APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. Prateek Gupta
Department	General Surgery
Topic of Thesis	Evaluation of Diagnostic performance of a Pre-Operative scale in predicting difficult Laparoscopic Cholecystectomy
Likely date of appearing in PG examination	May/June 2024
Date of enrollment	2 May, 2022
Name of Head of Department	Dr. Jaspal Singh
1) Supervisor **2) Co-Supervisor**	Dr. Amandeep Singh Nar Dr. Ajit Sood Dr. Atul Mishra
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Harpreet Kaur (Professor & Head, Pathology)	Mr. R K Sharma (Legal Expert)
Dr. Jaspal Singh (Professor & Head, Surgery)	Dr. Ramit Mahajan (Associate Professor, Gastroenterology)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology)	Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology)
Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal & Professor & Head, Cardiology)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / ~~No~~

Dr. Sandeep Puri
Chairperson
Research Committee

Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairperson
Ethics Committee

Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	DR. PRATEEK GUPTA 96 GUJRAL NAGAR, JALANDHAR, PUNJAB. PIN 144001
2	NAME OF THE INSTITUTE	Dayanand Medical College & Hospital, Ludhiana
3	COURSE OF STUDY AND SUBJECT	MS General Surgery
4	DATE OF ADMISSION OF COURSE	2 May, 2022
5	TITLE OF THE TOPIC	EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

One of the most common causes of abdominal pain is the presence of gallstones.[1] Cholecystectomy is the only effective management of symptomatic gallstones.[2] Surgeons are referred up to 93% of these cases.[3] Laparoscopic cholecystectomy is the gold standard in the treatment of Symptomatic Gall Stone diseases.[4] It has low incidence of mortality and morbidity along with a faster recovery period. Along with decreased post-operative pain, earlier oral intake, shorter hospital stay, early resumption of normal activity and improved cosmesis.

There is a marked reduction in incidence of wound complications and postoperative ileus in patients undergoing laparoscopic cholecystectomy.[5] At the beginning of the development of the laparoscopic technique, the rate of bile duct injuries was high along with complications due to the learning curve. With time, the rate of serious complications has decreased.[6-7]

Previous abdominal operations and liver cirrhosis or portal hypertension were seen as contraindications. Nowadays, these contraindications have almost disappeared Occasionally surgeons may face various problems while doing Laparoscopic cholecystectomy such as difficulties in accessing the peritoneal cavity, creating a pneumo-peritoneum, dissecting the gall bladder or extracting the excised gall bladder. The most common cause of conversion is difficult dissection of Calot's triangle.[8]

Various factors such as the age, sex, anatomical variations, history of previous surgery, obesity, or pathological factors like severe inflammation, impacted stones, external factors including failure of equipment may influence the procedure of laparoscopic cholecystectomy.[3] The evaluation of this difficulty also vary between the perception of one surgeon and another.

The Intra-operative scale given by Nassar et al.[9] in 1995 has become one of the most used scale to grade the difficulty of laparoscopic

cholecystectomy based on gallbladder, cystic pedicle, and presence of adhesions.

In recent times, rate of conversion of laparoscopic cholecystectomy to open cholecystectomy has dropped from 2-15% to 1-6%.[10] which results in decrease in peri-operative time, complication rates, peri-operative costs, length of hospital stay as well as hospital charges.

Converting a laparoscopic cholecystectomy should not be seen as a complication but rather a mature decision and hence a surgeon must not hesitate to convert to a open cholecystectomy. The better identification of various parameters predicting conversion would be useful to determine whether open cholecystectomy surgery should be performed initially, avoiding the potential complications brought through an intraoperative conversion from laparoscopic cholecystectomy to open cholecystectomy. improve preoperative patient counseling, better preoperative planning and avoiding lap-associated costs. It is necessary to realize that the need to convert to an open cholecystectomy is not a failure but instead it is an attempt to avoid severe complications and ensure patient safety.

Laparoscopic Cholecystectomy has certain technical difficulties like a relatively limited and fixed view of operative field, indirect contact with intra abdominal structures and limited tactile feedback during dissection and manipulation of tissues.

The difficulty is considered in cases of dense adhesions at Calot's triangle, history of upper abdominal surgery, acutely inflamed and gangrenous gallbladder, empyema of the gallbladder, Mirizzi's syndrome, previous cholecystostomy, and cholecystogastric or cholecystoduodenal fistula.[3,11] The prevalence of gallstone disease is two to three times more common in women than in men.[12] However, the risk of conversion is notably higher in men, a trend also observed across different types of surgery.[3]

A reliable scoring system will help the surgeons decide on a surgical approach, counsel the patients, reduce the risk of complication, reduce the rate of conversion to open cholecystectomy, and reduce overall medical cost.[13,14] The difficulty of the procedure can vary between one

and the other, the key is to predict this difficulty. In the literature, we find multiple scales to predict a difficult cholecystectomy; however, most of these are based on the conversion rate or the surgical times, which can vary according to the experience of the surgeon. Therefore, these scales cannot be used universally.[15]

In 2019 Nassar et al developed and validated a pre-operative scoring system that uses easily available pre-operative variables to predict difficult laparoscopic cholecystectomies the factors included were- age, gender, ASA classification, primary diagnosis, ultrasonographic/MRCP findings, history of ERCP and type of admission.[16,17]

The present study is aimed to validate that scoring system to help predict difficult laparoscopic cholecystectomy and to identify other parameters associated with a difficult case not included in the scale like, total leukocyte count, raised ALP, previous upper abdomen surgery, T2DM, serum amylase and lipase levels.

6.2 REVIEW OF LITERATURE

In 1684 Stalpert von der Wiel first incised the abdominal wall for bile drainage in a patient with an intraabdominal abscess due to gangrenous cholecystitis with calculi.[18-19]

In 1882 Carl Johann August Langenhueh.[18-20] successfully removed the gall bladder. Which became the Gold standard treatment for Symptomatic Cholelithiasis for over a century.

The first Laparoscopic cholecystectomy using keyhole approach was done by Mouret in 1987.[21]

In September 1992 A NIH consensus conference held in Bethesda concluded that laparoscopic cholecystectomy was the treatment of choice for cholelithiasis.[22]

In 1993 Cuschieri published a scale of difficulty for laparoscopic cholecystectomy in a text book which was further modified in a further publication published in The Lancet in 1998[17]

In 1995 Nassar et al published a grading system; which graded operative findings from the gallbladder, cystic pedicle and associated adhesions.[9]

Grade 1:	**Grade 2:**
Gallbladder—floppy, non-adherent *Cystic pedicle*—thin and clear *Adhesions*—Simple up to the neck/Hartmanns pouch	*Gallbladder*—Mucocele, Packed with stones *Cystic pedicle*—Fat laden *Adhesions*—Simple up to the body

Grade 3:	**Grade 4**:
Gallbladder—Deep fossa, Acute cholecystitis, Contracted, Fibrosis, Hartmans adherent to CBD, Impaction *Cystic pedicle*—Abnormal anatomy or cystic duct short, dilated or obscured *Adhesions*—Dense up to fundus;	*Gallbladder*—Completely obscured, Empyema, Gangrene, Mass *Cystic pedicle*—Impossible to clarify *Adhesions*—Dense, fibrosis, wrapping the gallbladder, Duodenum or hepatic flexure

Involving hepatic flexure or duodenum	difficult to separate

In 1996 Kum et al.[23] compared the results of Laparoscopic cholecystectomy for acute cholecystitis with that of routine symptomatic gallbladders. Finding that lap cholecystectomy for inflamed gallbladders had a higher conversion rate than laparoscopic cholecystectomy for routine symptomatic gallbladders. It had better postoperative recovery but also had higher risk of common bile duct injury.

In 1996 Liu et al and Kana et al considered gallbladder wall thickness to be the most important sonographic risk factors of converion to open cholecystectomy. Patient with solitary large stones inside the gall bladders are associated with significantly longer operative time due to difficulty in grasping the gall bladder. Increased operative time was demonstrated in patients with gall bladder wall thickness greater than 3mm.

In 1996 Lam CM, Murray FE, Cuschieri A.[24] Did a survey to determine the effect of the introduction of laparoscopic cholecystectomy on the rates of cholecystectomy (total and laparoscopic) in Scotland. From 1977 to 1990, the Scottish cholecystectomy rate fell by an average of almost 1% per annum. With the advent of laparoscopic cholecystectomy, the total cholecystectomy rate (open and laparoscopic) rose considerably by 18.7% from 1989-93. The largest increase (25%) was observed in the 45-64 years age group but it was also particularly evident (19%) in elderly patients (65-74 years). Subjects were more likely to undergo laparoscopic cholecystectomy than open cholecystectomy if they were young and female.

In 1998 Lujan et al[25] compared the results of laparoscopic cholecystectomy with those of open cholecystectomy in the treatment of symptomatic cholelithiasis. Conversion from laparoscopic cholecystectomy to open cholecystectomy was necessary in 15% of the patients. The patients undergoing laparoscopic cholecystectomy

had a significant lower rate of complications, shorter hospital stay and more comfortable postoperative period than those undergoing open cholecystectomy.

In 2005 Benjie Tang, Alfred Cuschieri.[26], concluded that Single factors that appear to be important in influencing conversion from Laparoscopic to open include male gender, extreme old age, morbid obesity, cirrhosis, previous upper abdominal surgery, severe/advanced acute and chronic disease, and emergency LC. They found that in training of a resident the number of cases needed to reach proficiency was more than 200. The value of predictive scoring system thus becomes important in the selection of cases for resident training.

In 2009 Randhawa and Pujahari.[15] conducted a study to develop scoring system to predict the difficulty level in laparoscopic cholecystectomy using factors like age, sex, history of hospitalization, clinical factors and ultrasonographic factors. The conversion is higher the higher the age is and becomes difficult cholecystectomy in case of ages above 60. Male sex makes the patient more probable to undergo open cholecystectimy. BMI obese group reported to be having 6.2% conversion in relation to over all 5.4%. They found acute cholecystitis in obese as the most important factor for conversion. Even history of an acute attack requiring hospitalisation made the surgery difficult. There is a higher rate of bleeding, ductal injury and subsequent conversion in acute cholecystitis Clinically, palpable gallbladder is not reported as a predictor of difficult cholecystectomy.

Thick-walled GB is one of the predictor of conversion and was found to be a significant factor. Upper abdominal surgery is reported to have high rate of conversion 37.5% due to dense adhesion from previous surgery. With increasing experience on adhesiolysis and advanced laparoscopic surgery, conversion is less often seen.

In 2013,Gupta N.[27] et al found that history of hospitalization, palpable gall bladder, impacted stone and gall bladder wall thickness were statistically significant factors for prediction of difficult laparoscopic cholecystectomy.

In 2015 Goonawardena J,et al.[28] concluded that during lap cholecystectomy, a small number of patients will continue to require open surgery for safe completion and presented a four evidence based normograms as a practical individual risk stratification tool to perdict probability of conversion to open based on pre-operative settings.

In 2015 Sippey M et al.[29] concluded that those who required conversion were older and body mass index was greater compared with those whose procedure was completed laparoscopically. Vascular, cardiac, renal, pulmonary, neurologic, hepatic disease, diabetes, and bleeding disorders were more prevalent in patients who were converted to open.

In 2017 Griffiths.[17] concluded that an operative difficulty scale can standardize the description of operative findings by different surgeons to help facilitate audit, training assessment and research and provide a tool for reporting operative findings, disease severity and technical difficulty , that can be used in future research to reliably compare outcomes according to the case mix and intra-operative findings.

In 2017 Siddiqui M, Rizvi S.[30] gave A standardized ultrasound scoring system for preoperative prediction of difficult laparoscopic cholecystectomy, which included factors like GB wall thickness ,Transverse diameter of GB,Presence of impacted stones, CBD diameter, Presence of pericholecystic collection, Number of stones and Liver size.

In July 2017 Yew HU, et al.[3], did a systematic review of 30 English language studies about the risk factors for conversion of lap cholecystectomy to open surgery. They found a credible association between some frequently reported risk factors such as- male sex, older age, high BMI, presence of acute cholecystitis – and conversion of Laparoscopic cholecystectomy and Open Cholecystectomy. They concluded that the use of prediction risk scores or nomograms may be the most helpful tool in stratifying risks in a clinical scenario. Through such prediction tools, clinicians can optimize care based on the known risk factors for conversion, while patients can be better informed of the risks associated with their surgery.

In 2019 Nassar et al.[16] developed and validated a pre-operative scoring system that uses easily available pre-operative variables to predict difficult laparoscopic cholecystectomies including factors like patient's history, ASA score, sonography findings, primary diagnosis, type of admission, to determine the risk of difficult laparoscopic cholecystectomy.

In 2021 Goyal, Muthuraman and Sharma.[31] gave a modified Randhawa and Pujahari Score that now included history of Ercp, history of Diabetes mellitus in addition to the previous scale.

In 2021 Giraldo, et al demonstrated that, as the difficulty predicted by the preoperative scale increases, the rate of conversion to open procedure, subtotal cholecystectomy, complications and failure of critical view of safety increases and suggested implementing the pre-operative scale in all patients who are planning laparoscopic cholecystectomy.

6.3 AIMS AND OBJECTIVES OF THE STUDY

- To Evaluate the predictive capacity of a difficult cholecystectomy with a preoperative scale.

7. MATERIALS AND METHODS

This prospective and observational study will be conducted at DMCH for a time period of one year. All the Patient admitted to DMCH planned for Laparoscopic Cholecystectomy will be included. A preoperative scale developed by Nassar et al will be used which includes patient's history, ASA score, sonography findings, primary diagnosis, type of admission, to determine the risk of difficult laparoscopic cholecystectomy. This will be compared to the grade given by the surgeon according to the Intra-operative difficulty scale for laparoscopic cholecystectomy. In addition Pre-operative findings like Total Lymphocyte count, raised ALP, previous upper abdomen surgery, T2DM, S. Amylase, S. Lipase will be recorded.

7.1 SOURCE OF DATA

Patient undergoing Laparoscopic Cholecystectomy in General Surgery department in DMCH giving consent to be part of the study.

7.2 METHOD OF COLLECTION OF DATA

- Duration of Study- 1 year from 15 September 2022-September 2023

Inclusion Criterion

Patient undergoing Laparoscopic Cholecystectomy in Dayanand Medical College and Hospital.

Exclusion Criterion

Patient unfit for anesthesia

Open conversion due to equipment failure

DURATION OF STUDY/ NUMBER OF CASES: 1 year from 15th September 2022- September 2023

OUTCOME: Evaluation of Diagnostic performance of a Pre-Operative scale in predicting difficult Laparoscopic Cholecystectomy

STATISTICAL ANALYSIS

Data will be described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. For comparing categorical data, Chi square (?2) test will be performed and fisher exact test will be used when the expected frequency is less than 5. A probability value (p value) less than 0.05 will be considered statistically significant. All statistical calculations will be done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS ? IF SO, PLEASE DESCRIBE BRIEFLY.

No

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached herewith

8. LIST OF REFERENCES.

1. Johnson CD. ABC of the upper gastrointestinal tract. Upper abdominal pain: Gall bladder. BMJ. 2001;323:1170-3. doi: 10.1136/bmj.323.7322.1170. PMID: 11711412; PMCID: PMC1121646.
2. Gutt C, Schläfer S, Lammert F. The Treatment of Gallstone Disease. Dtsch Arztebl Int. 2020;117:148-158. doi: 10.3238/arztebl.2020.0148. PMID: 32234195; PMCID: PMC7132079.
3. Alan Shiun Yew Hu, R. Menon, R. Gunnarsson, A. de Costa, Risk factors for conversion of laparoscopic cholecystectomy to open surgery – A systematic literature review of 30 studies,The American Journal of Surgery,Volume 214, Issue 5,2017,Pages 920-30
4. Lubawski J, Saclarides T. Postoperative ileus: strategies for reduction. Ther Clin Risk Manag. 2008;4:913-7. doi: 10.2147/tcrm.s2390. PMID: 19209273; PMCID: PMC2621410.
5. Soper NJ, Stockmann PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy. The new 'gold standard'? Arch Surg. 1992;127:917-21; discussion 921-3. doi: 10.1001/archsurg.1992.01420080051008. PMID: 1386505.
6. Archer SB, Brown DW, Smith CD, Branum GD, Hunter JG. Bile duct injury during laparoscopic cholecystectomy: results of a national survey. Ann Surg. 2001;234:549-58; discussion 558-9. doi: 10.1097/00000658-200110000-00014. PMID: 11573048; PMCID: PMC1422078.
7. Way LW, Stewart L, Gantert W, Liu K, Lee CM, Whang K, Hunter JG. Causes and prevention of laparoscopic bile duct injuries: analysis of 252 cases from a human factors and cognitive psychology perspective. Ann Surg. 2003;237:460-9. doi: 10.1097/01.SLA.0000060680.92690.E9. PMID: 12677139; PMCID: PMC1514483.
8. Ashutosh Kumar, Manjul Mohan, C.P Pandey. Factors responsible for conversion of laparoscopic to open

cholecystectomy. International Journal of Contemporary Medicine Surgery and Radiology. 2020;5:D54-D57.

9. Nassar A, Ashkar K, Mohamed A, Hafiz A (1995) Is laparoscopic cholecystectomy possible without video technology? Minim Invasive Ther 4:63–65
10. Sakpal SV, Bindra SS, Chamberlain RS. Laparoscopic cholecystectomy conversion rates two decades later. JSLS. 2010;14:476-83. doi: 10.4293/108680810X12924466007926. PMID: 21605512; PMCID: PMC3083035.
11. veerank n, togale md. validation of a scoring system to predict difficult laparoscopic cholecystectomy: a one-year cross-sectional study. j west afr coll surg. 2018;8:23-39. pmid: 30899702; pmcid: pmc6398510.
12. Novacek G. Gender and gallstone disease. Wien Med Wochenschr. 2006;156:527-33. doi: 10.1007/s10354-006-0346-x. PMID: 17103289.
13. veerank n, togale md. validation of a scoring system to predict difficult laparoscopic cholecystectomy: a one-year cross-sectional study. j west afr coll surg. 2018;8:23-39. pmid: 30899702; pmcid: pmc6398510.
14. Ary Wibowo A, Tri Joko Putra O, Noor Helmi Z, Poerwosusanta H, Kelono Utomo T, Marwan Sikumbang K. A Scoring System to Predict Difficult Laparoscopic Cholecystectomy: A Five-Year Cross-Sectional Study. Minim Invasive Surg. 2022 Sep 6;2022:3530568. doi: 10.1155/2022/3530568. PMID: 36110248; PMCID: PMC9470297.
15. Randhawa JS, Pujahari AK. Preoperative prediction of difficult lap chole: a scoring method. Indian J Surg. 2009;71:198-201. doi: 10.1007/s12262-009-0055-y. Epub 2009 Sep 2. PMID: 23133154; PMCID: PMC3452633.
16. Nassar AHM, Hodson J, Ng HJ, Vohra RS, Katbeh T, Zino S, et al. CholeS Study Group, West Midlands Research Collaborative. Predicting the difficult laparoscopic cholecystectomy: development and validation of a pre-operative risk score using

an objective operative difficulty grading system. Surg Endosc. 2020;34:4549-4561. doi: 10.1007/s00464-019-07244-5. Epub 2019 Nov 15. PMID: 31732855.

17. Griffiths EA, Hodson J, Vohra RS, Marriott P, Katbeh T, Zino S, et al. West Midlands Research Collaborative. Utilisation of an operative difficulty grading scale for laparoscopic cholecystectomy. Surg Endosc. 2019;33:110-121. doi: 10.1007/s00464-018-6281-2. Epub 2018 Jun 28. Erratum in: Surg Endosc. 2018 Aug 22;: PMID: 29956029; PMCID: PMC6336748.
18. Blum CA, Adams DB. Who did the first laparoscopic cholecystectomy? J Minim Access Surg. 2011;7:165-8. doi: 10.4103/0972-9941.83506. PMID: 22022097; PMCID: PMC3193755.
19. Yamakawa T, Fukuda N. [History of surgery for cholelithiasis: from the era of cholecystostomy to laparoscopic surgery]. Nihon Geka Gakkai Zasshi. 2000;101:877-81. Japanese. PMID: 11201117.
20. Traverso LW. Carl Langenbuch and the first cholecystectomy. Am J Surg. 1976;132:81-2. doi: 10.1016/0002-9610(76)90295-6. PMID: 782269.
21. Mouret, P. How I developed laparoscopic cholecystectomy. Ann Academy Med Singapore. 1996;25:744-7.
22. Gallstones and Laparoscopic Cholecystectomy, NIH Consens Statement Online 1992 Sep 14-16 [cited year month day];10:1-20.
23. Kum CK, Eypasch E, Lefering R, Paul A, Neugebauer E, Troidl H. Laparoscopic cholecystectomy for acute cholecystitis: is it really safe?. World journal of surgery. 1996;20:43-9.
24. Lam CM, Murray FE, Cuschieri A. Increased cholecystectomy rate after the introduction of laparoscopic cholecystectomy in Scotland. Gut. 1996;38:282-4.
25. Lujan JA, Parrilla P, Robles R, Marin P, Torralba JA, Garcia-Ayllon J. Laparoscopic cholecystectomy vs open

cholecystectomy in the treatment of acute cholecystitis: a prospective study. Arch Surg. 1998;133:173-5.

26. Benjie Tang, Alfred Cuschieri, Conversions During Laparoscopic Cholecystectomy: Risk Factors and Effects on Patient Outcome, Journal of Gastrointestinal Surgery, Volume 10, Issue 7, 2006, Pages 1081-1091, ISSN 1091-255X, https://doi.org/10.1016/j.gassur.2005.12.001.
27. Gupta N, Ranjan G, Arora MP, Goswami B, Chaudhary P, Kapur A et al. Validation of a scoring system to predict difficult laparoscopic cholecystectomy. Int J Surg. 2013;11:1002-6.
28. Goonawardena J, Gunnarsson R, de Costa A. Predicting conversion from laparoscopic to open cholecystectomy presented as a probability nomogram based on preoperative patient risk factors. Am J Surg. 2015;210:492-500.
29. Megan Sippey, Marysia Grzybowski, Mark L. Manwaring, Kevin R. Kasten, William H, et al. Acute cholecystitis: risk factors for conversion to an open procedure, Journal of Surgical Research, Volume 199, Issue 2, 2015, Pages 357-361, ISSN 0022-4804, https://doi.org/10.1016/j.jss.2015.05.040.
30. Siddiqui M, Rizvi S, Sartaj S, Ahmad I, Rizvi S (2017) A standardized ultrasound scoring system for preoperative prediction of difficult laparoscopic cholecystectomy. J Med Ultrasound 25:227–231
31. Goyal P, Muthuraman S, Sharma S. Simple and Reliable Scoring System to Predict Difficult Laparoscopic Cholecystectomy Preoperatively. World J Lap Surg 2021;14:34-38.
32. Ramírez-Giraldo C, Alvarado-Valenzuela K, Isaza-Restrepo A, Navarro-Alean J. Predicting the difficult laparoscopic cholecystectomy based on a preoperative scale. Updates Surg. 2022;74:969-77.
33. veerank n, togale md. validation of a scoring system to predict difficult laparoscopic cholecystectomy: a one-year cross-sectional study. j west afr coll surg. 2018;8:23-39.

34. Kulkarni, shrirang v.; kumar, sukumar s.. preoperative predictors of a difficult laparoscopic cholecystectomy. international surgery journal**,** [s.l.], v. 5, n. 2, p. 608-13, jan. 2018. issn 2349-2902.
35. Balazs I. Lengyel, Maria T. Panizales, Jill Steinberg, Stanley W. Ashley, Ali Tavakkoli,
36. Laparoscopic cholecystectomy: What is the price of conversion?, Surgery, Volume 152, Issue 2, 2012, Pages 173-8, ISSN 0039-6060, https://doi.org/10.1016/j.surg.2012.02.016.
37. Gupta N, Ranjan G, Arora MP, Goswami B, Chaudhary P, Kapur A, Kumar R, Chand T. Validation of a scoring system to predict difficult laparoscopic cholecystectomy. Int J Surg. 2013;11:1002-6.
38. Bourgouin S, Mancini J, Monchal T (2016) How to predict difficult laparoscopic cholecystectomy? Proposal for a simple preoperative scoring system. Am J Surg 212:873–81
39. Vivek M, Augustine A, Rao R (2014) A comprehensive predictive scoring method for difficult laparoscopic cholecystectomy. J Minim Access Surg 10:62–7
40. Lal P, Agarwal P, Malik V, Chakravati A (2002) A difficult laparoscopi that requires conversion to open procedure can be predicted by preoperative ultrasonography. JSLS 6:59–63
41. Carbotta G, Panebianco A, Laforgia R, Pascazio B, Balducci G, Bianchi F et al (2018) A new clinical ultrasound score to predict difficult videolaparocholecystectomies: a prospective study. Ann Med Surg 35:59–63
42. Sugrue M, Sahebally SM, Ansaloni L, Zielinski MD. Grading operative findings at laparoscopic cholecystectomy- a new scoring system. World J Emerg Surg. 2015 Mar 8;10:14. doi: 10.1186/s13017-015-0005-x. PMID: 25870652; PMCID: PMC4394404.
43. Kama NA, Kologlu M, Doganay M, Reis E, Atli M, Dolapci M. A risk score for conversion from laparoscopic to open cholecystectomy. Am J Surg. 2001;181:520-5.
44. Paruthy S, Paruthy SB. Nassar operative grade and

ultrasonography prediction for difficult laparoscopic cholecystectomy. Int Surg J 2021;8:1734-41.

45. Sugrue M, Sahebally SM, Ansaloni L, Zielinski MD. Grading operative findings at laparoscopic cholecystectomy- a new scoring system. World J Emerg Surg. 2015 Mar 8;10:14.
46. Kama NA, Kologlu M, Doganay M, Reis E, Atli M, Dolapci M. A risk score for conversion from laparoscopic to open cholecystectomy. Am J Surg. 2001;181:520-5.

PROFORMA

Sr. No.

Name- **Age-**

Sex- **MRD Number-**

Address-

Mobile Number-

Chief Complaints-

History of Present illness-

Past History-

H/o Diabetes mellitus **Hypertension**

CAD **PCOD**

OSA **THYROID DISEASE**

Signature of Candidate **Signature of Supervisor**

TB

History Of Previous Surgery-

Primary Diagnosis

A) PANCREATITIS

B) BILIARY COLIC

C) CHOLEDOCOLITHIASIS

D) CHOLECYSTITIS

USG report/Findings

a. Thick Walled Gallbladder-

b. CBD diation-

Signature of Candidate **Signature of Supervisor**

H/o ERCP, if yes findings:

Type of Admission:

a) Elective

b) Delayed

c)Emergency

Occupation:

Signature of Candidate **Signature of Supervisor**

Investigations:

HMG	
LFT	
PTI/INR	
RFT	
HBA1C	
SERUM AMYLASE	
SERUM LIPASE	

ASA SCORE - a) 1 b)2 c)3 d)4

Signature of Candidate **Signature of Supervisor**

Pre-operative Risk Scale

Variable	Points
Age	
<40	**0**
>40	**1**
Gender	
Female	**0**
Male	**1**
ASA classification	
1	**0**
2	**1**
3	**2**
4	**7**
Primay diagnosis	
Pancreatitis	**0**
Biliary colic	**0**
Choledocolithiasis	**1**
Cholecystitis	**4**
Thick walled gallbladder (>3mm)	
No	**0**
Yes	**2**
CBD dilation (>6mm)	
No	**0**
Yes	**1**
ERCP	
No	**0**
Yes	**1**
Type of Admission	
Elective	**0**
Delayed	**1**
Emergency	**2**

Score according to pre-operative findings

Low risk 0-1

Intermediate risk- 2-6

Signature of Candidate **Signature of Supervisor**

High risk 7-19

Intra-operative Scale

Grade 1 **Grade 2** **Grade 3** **Grade 4**

Grade 1: *Gallbladder*—floppy, non-adherent *Cystic pedicle*—thin and clear *Adhesions*—Simple up to the neck/Hartmanns pouch	**Grade 2:** *Gallbladder*—Mucocele, Packed with stones *Cystic pedicle*—Fat laden *Adhesions*—Simple up to the body
Grade 3: *Gallbladder*—Deep fossa, Acute cholecystitis, Contracted, Fibrosis, Hartmans adherent to CBD, Impaction *Cystic pedicle*—Abnormal anatomy or cystic duct short, dilated or obscured *Adhesions*—Dense up to fundus; Involving hepatic flexure or duodenum	**Grade 4**: *Gallbladder*—Completely obscured, Empyema, Gangrene, Mass *Cystic pedicle*—Impossible to clarify *Adhesions*—Dense, fibrosis, wrapping the gallbladder, Duodenum or hepatic flexure difficult to separate

Images-

Signature of Candidate **Signature of Supervisor**

INFORMED PATIENT CONSENT

Date: _____

I…….D/o, W/o, S/o……..…… am willing to participate in the study **"EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

……. ……
Signature of the Witness Signature of the patient

Name:

Signature of Candidate **Signature of Supervisor**

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य "**EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____	_____
गवाह के हस्ताक्षर	रोगी के हस्ताक्षर/अंगूठे का निशान
नाम:	नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

“EVALUATION OF DIAGNOSTIC PERFORMANCE OF A PRE-OPERATIVE SCALE IN PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY” ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

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ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

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ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

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ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ